

Troubleshooting Septic Tanks



Sara Christopherson
Phone: 612-625-7243
Email: shc@umn.edu
Website: <http://septic.umn.edu>

Presentation Topic Overview

- ❑ Process of troubleshooting tanks
- ❑ Odors
- ❑ Tank start-up with new systems
- ❑ Leaks and clean water
- ❑ Toxics
- ❑ Problem sources/sites

Process of Troubleshooting Tanks

- ❑ Off look or smell to tank?
- ❑ Effluent filter plugging up routinely?
- ❑ Get list of medicines/cleaners
- ❑ Get lab analysis to determine how "sick" the tank is
 - ❑ BOD and TSS
 - ❑ FOG only if commercial or a lot of FOG visible
- ❑ Determine last date of tank pumping and amount of sludge and scum

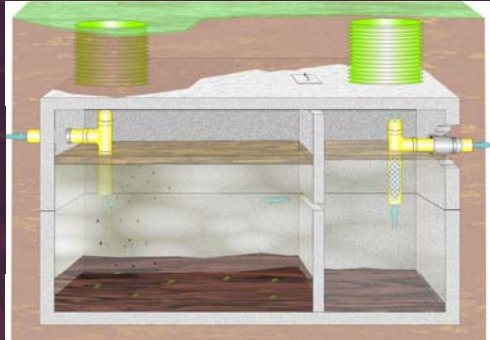


Sludge Levels

- ❑ Indicates amount of settling in tank
- ❑ Use sampling probe (Sludge Judge or Dip Stick)
- ❑ Should be three distinct layers if functioning properly
- ❑ Heavy accumulation means excess inputs (garbage disposal?)



Scum in tank



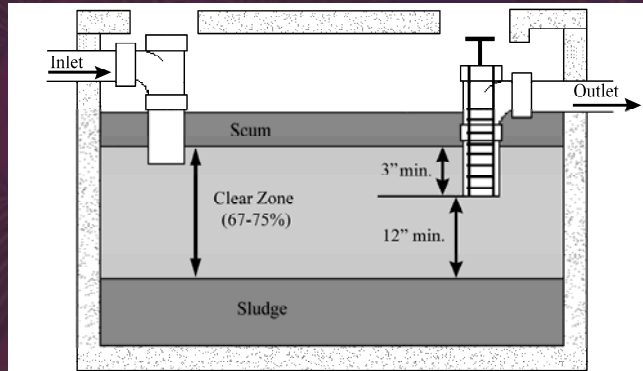
- ❑ Heavy accumulation may mean excess FOG input
- ❑ Need to maintain 2 day HDT between solids layers

Baffles

- ❑ Plugging of baffles indicates use issues or construction problems
- ❑ Designed to only let water in clear zone to pass
- ❑ Indicates system upsets
- ❑ Three distinct zones in septic tank should be present

When to pump tank

- 25 - 33 % of working volume of tank
- High risk pump more often



Effluent screen

- Placed in outlet of septic tank for additional filtration
- Remove solids
- Requires periodic cleaning
- The need for frequent cleaning is an indication of organic overloading



Odors

- ☑ Inside
 - ☑ Venting
- ☑ Outside
 - ☑ Seals
 - ☑ Filters



Outdoor Odor Problems

- ☑ Odors near septic tank
 - ☑ Manholes and riser secure?
 - ☑ Cover with soil or mulch
 - ☑ Seal with weather stripping
 - ☑ Sick septic tank?
 - ☑ Excessive chemical use in tank or lack of maintenance can effect odor
 - ☑ Pump tanks, reduce chemical usage

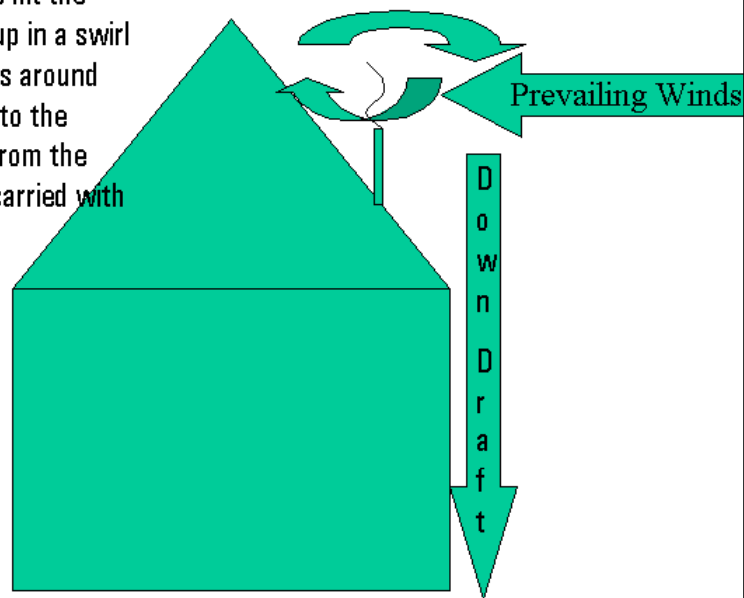


Odors Continued

- ❑ Odors near pump tank
 - ❑ Tank lid secure
 - ❑ Electrical conduit sealed?
- ❑ Odors near soil treatment units
 - ❑ Surfacing effluent
 - ❑ Vent pipe open



Prevailing winds hit the roof and curve up in a swirl which then loops around and goes down to the ground. Gases from the vent stack are carried with it.



Odors in Yard

- ❑ Can get caught under roof over hangs
- ❑ Wind patterns can limit odor traveling away from home
 - ❑ Valleys, forested areas, low areas, etc
- ❑ Vent can be extended
- ❑ Carbon filters can be added on end
 - ❑ Be careful of winter use
 - ❑ Last 1-5 years



Tank Start-up with New Systems

- ❑ Toxic tank
- ❑ Cleaning Chemicals
- ❑ Construction Chemicals
- ❑ Other Outcomes
 - ❑ First time on septic- Education on use
 - ❑ Understanding the need for maintenance

Pump in the first 1-3 months

Leaks & Clean Water into Tanks

Leaks

- ▣ In home
 - ▣ Drips
 - ▣ A $\frac{1}{2}$ gallon per minute leak results in 700 gpd!
- ▣ In system
 - ▣ Leaks into tank/risers

Extras

- ▣ Footing drains
 - ▣ Sump pumps
- ▣ Roof leaders
- ▣ Treated water
 - ▣ Pools
 - ▣ Hot tubs
- ▣ Water treatment devices
 - ▣ Water softener
 - ▣ Iron filter
 - ▣ Reverse osmosis, etc

Mixing of Tank

Reasons

- ▣ Leaks/clean water
- ▣ Peak use
 - ▣ Multiple shower heads
- ▣ Pumping to tank
- ▣ Elevation difference
 - ▣ Upstairs laundry or large bath tub

Solutions

- ▣ Control usage
- ▣ Controlling loading
 - ▣ Timer control
- ▣ Increased tank capacity
- ▣ Effluent filter

Water Treatment Devices

- ❑ Water Softener
 - ❑ Salt- Concrete
 - ❑ Scum- Separation
 - ❑ Additional water
 - ❑ On demand regeneration better
 - ❑ Softener misuse and malfunctions
- ❑ Iron Filters
 - ❑ Change iron from dissolved to solid
 - ❑ Results in iron accumulation in tank
 - ❑ More pumping needed
 - ❑ Unknown impacts to system
 - ❑ Large amount of back wash no on depend



Extra Water and Waste Producers

- ❑ Garbage disposal including many dishwashers
 - ❑ More food
 - ❑ More water
 - ❑ Slower to breakdown
 - ❑ Slower to settle
- ❑ Grinder pumps in the basement
- ❑ Jacuzzis



Leaks out of Tanks

- ❑ Sends untreated wastewater into environment
- ❑ Can cause structural issues with the tank

Toxic Waste

- ❑ Chemicals
 - ❑ Antibacterial
- ❑ Medicines
- ❑ Additives
 - ❑ Safe
 - ❑ Effective



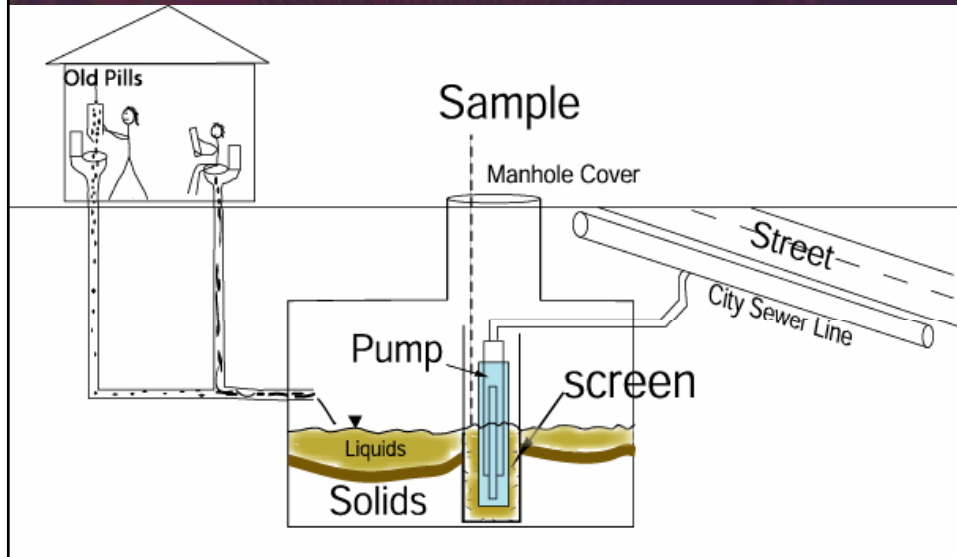
Problem Sites

- ☒ Some problem sites:
 - ☒ Dwellings with occasional or chronic prescription drug use
 - ☒ Dwelling with meth labs!
 - ☒ Restaurants
 - ☒ Camps, Hotels, Churches and Schools
 - ☒ Laundromat
 - ☒ Medical and dental facilities
 - ☒ Beauty salons
 - ☒ Car Wash
 - ☒ Slaughter house
 - ☒ Dog kennels

Dwellings

- ☒ Very clean people
- ☒ Antibacterial soaps
- ☒ Antibiotic use (short and long term)
- ☒ Bulimia
- ☒ Chemotherapy
- ☒ Heart medicine, etc
- ☒ Water treatment devices
- ☒ Organic and hydraulic overloads

What NOT to do with your Old Pills



Meth Labs and Septic Systems



*Chemicals recovered from inside a meth lab.
Fact sheet on our website*

Chemicals Used in Meth Production

Type of Chemical	Chemical Name	Common Source
Solvents	Toluene	Paint thinner
	Methanol	Anti-freeze "Heet"
	Ethyl Ether	Starting fluid
	Benzene, Xylene, Acetone, Hexane	
Corrosives	Anhydrous Ammonia	On-farm nurse tanks
	Sodium Hydroxide	Lye, "Draino"
	Hydrochloric Acid	Hardware stores
Metals and Salts	Iodine	Iodine Crystals
	Mercury	Thermometers
	Red Phosphorus	Match books
	Lithium	Camera batteries
	Sodium Metal	
Over-the-counter medicine	Ephedrine Pseudoephedrine Phenyl-2-propanone	Over the counter cold medicines and dietary supplements

Concerns for Wastewater Professionals

- ❏ Currently there are no guidelines related to meth lab waste for professionals in the onsite industry
- ❏ Generally toxic chemicals are diluted by the large volume of the septic tanks and can no longer be classified as hazardous

Signs of Meth Labs

- ❑ Houses or apartments with blocked-off windows or windows covered with foil
- ❑ Discoloration of structures and pavement
- ❑ Unmarked propane tanks with blue or green fittings
 - ❑ Anhydrous ammonia reacts with copper fittings
 - ❑ These tanks are dangerous!
- ❑ Unmarked trash bags may contain contaminated glassware or needles
 - ❑ Moving the bag could expose the contents to water or air and cause an explosion.



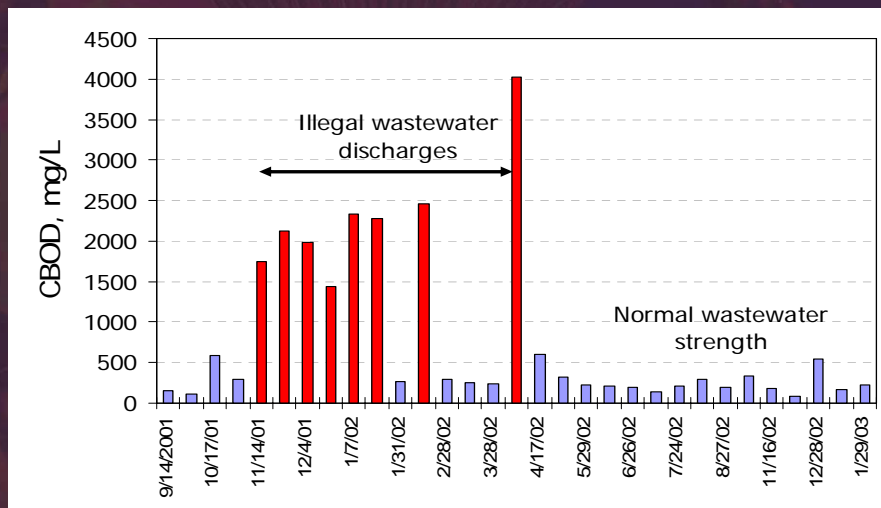
Signs of meth lab waste

- ❑ Strong or unusual odors
 - ❑ Solvents
 - ❑ Ammonia
 - ❑ Vinegar
- ❑ Abnormally high or low pH
- ❑ Abnormally high CBOD spikes
- ❑ Wastewater tests positive for Volatile Organic Chemicals (VOCs)

MN Case Study

- Cluster wastewater treatment system (domestic waste)
- CBOD spikes 10 times stronger than "normal" domestic waste
 - Average CBOD around 265 mg/L
 - Spikes as high as 4000 mg/L
- pH drops in influent wastewater coincide with CBOD spikes
 - Average pH 7.0 - 7.5 SU
 - Drops around 4.0 - 5.0 SU

Case Study - BOD spikes



Case Study - action taken

- ☒ Monitor influent CBOD, pH
- ☒ Called local Deputy Sheriff
 - ☒ Sheriff ran background checks on residents
- ☒ Called local Fire Department
 - ☒ Fire Department had equipment to scan for VOCs
 - ☒ Samples testing positive for VOCs were sent in for analytical tests

Case Study - action taken

- ☒ Called in the Drug Enforcement Administration for further assistance
- ☒ Some samples tested "positive" for VOCs.
- ☒ Positive Chemical Hits
 - ☒ Benzyl Alcohol (used in solvents and paint)
 - ☒ 12.9 ug/L
 - ☒ Phenol (fire hazard, found in urine, disinfectants and over the counter drugs)
 - ☒ 66.0 ug/L
 - ☒ 4-Methyl phenol
 - ☒ 1210 ug/L

Who to Contact

1. Local Law Enforcement Agency or 911
2. Duty Officer?
3. DNR?

Other Challenging "Toxic" Waste Streams



Flow and Waste Strength

- ☒ Flow measurement must be provided
- ☒ Estimated of measured
 - ☒ BOD
 - ☒ TSS
 - ☒ Oil and Grease
- ☒ Sufficient detention time and/or pretreatment
 - ☒ BOD < 200 mg/l
 - ☒ TSS < 65 mg/l
 - ☒ Oil and Grease < 30 mg/l

Wastewater Use in Home

Component	gpd/cap	% of total
Faucets	10.9	15.7
Dishwasher	1.0	1.4
Clothes	15.0	21.7
Showers	11.6	16.8
Bath	1.2	1.7
Toilet	18.5	26.7
Leaks and others	11.1	16.0
Total	69.3	100

Monitoring

- ☒ Sampling
 - ☒ Timing -after busy weekend
 - ☒ Mature tank
- ☒ Location
 - ☒ Average - Pump tank
 - ☒ Outlet baffle of last tank
- ☒ Test
 - ☒ Sludge and scum
 - ☒ BOD
 - ☒ TSS
 - ☒ FOG
 - ☒ Temperature
- ☒ Cost ~ \$100 for BOD/TSS/FOG
- ☒ Time



Camp Grounds & RV Dump Stations

- ☒ Potential for users unfamiliar with onsites
 - ☒ Toilets sometimes used as garbage cans
- ☒ Peak flows very high
 - ☒ Consider extra tank capacity and timers
- ☒ RV waste
 - ☒ Harmful chemicals to control odor including:
 - ☒ Formaldehyde the organic strength is so high that the resulting mixture in a holding tank is fifteen to twenty times stronger
 - ☒ Quats are not biodegradable and deodorize by killing the microorganisms
 - ☒ Enzyme-based products employ natural organic chemicals, because less effective not used much
 - ☒ Consider advance treatment or operating as holding tank

Laundromat

- ☒ High soap/chemical use
 - ☒ Specify that only liquid soaps should be used because some cheap powders have fillers
 - ☒ Sell only liquid soaps which do not have a bleach additive
- ☒ High water usage/hot water
 - ☒ Consider doubling tank capacity
 - ☒ Low water use washing machines
- ☒ Lint
 - ☒ Specify lint filters in facility
 - ☒ Commercial size effluent filter on septic tank
 - ☒ Increase baffles size to 50-60%

Schools and Churches

- ☒ High flows events common
 - ☒ Consider extra tanks, timers and dual fields so one can be rested
- ☒ Meal preparation?



Hotels and Motels

- ❑ Food preparation?
- ❑ If more of a seasonal facility consider dual fields to rest
- ❑ Potential for users unfamiliar with onsite
 - ❑ Consider commercial size effluent filters





Medical Facilities



- ❑ Potential for users unfamiliar with onsite
 - ❑ Consider commercial size effluent filters
- ❑ Sharp/red bag waste must not go into system
- ❑ Prescriptions
 - ❑ Left over medicine should not be flushed
- ❑ Cleaning chemicals
 - ❑ The minimum amounts should be used

Beauty Salons and Barbers










Hair

-  Good catch basins in sinks
-  Commercial size effluent filter

Chemicals

-  Have 1 sink for rinsing out perms/hair color which goes to holding tank
-  Separate tank for hair washing goes to onsite

Automotive and Car Wash

-  No floor drains to onsite where vehicle maintenance is being performed
 -  Sent to holding tank
-  Flammable waste traps
 -  Not always required, but good idea in case of spill or misuse
-  Hazardous waste
 -  Not allowed to enter the system
 -  If thick layer of oil/grease on top of tank, tests should be run to determine quality
-  Sand
 -  Can be thin spread or land filled (check local regulations)

Slaughter Facility

- ❑ No blood/particles down the drain
 - ❑ Must go to holding tank, can be sold to render
- ❑ Residual blood will make it down the drain
- ❑ Double tank capacity and commercial size effluent filter recommended



Dog Kennels

- ❑ Not a septic system
- ❑ Don't mix animal and human waste
- ❑ Hair
 - ❑ Good catch basins in sinks/drains
 - ❑ Commercial size effluent filter
- ❑ No feces going down the drain
 - ❑ - dealt with as solid waste or land applies
- ❑ Limit chemical usage



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