Septic System, How Might You Fail Me? Let Me Count The Ways…

As long as you pump your septic tank regularly, you should never have a problem. Right...?

Regular septic tank pumping is the single best thing you can do to maintain the health of your septic system, but its not a guarantee of trouble-free septic system ownership.

In an ideal world, if everything is done perfectly by all parties all the time, onsite sewage systems should perform well and their owners should never have a problem. But alas, we don't live in a

perfect world. Sometimes failures happen.

Most septic owners have been warned that **NOT pumping their tank on a regular basis** is the fastest way to doom their septic system to failure. As the septic tank fills up with solids, the effluent water leaving the tank gets dirtier and dirtier and starts to carry solids out with the flow to the drain field. This organic and inert material can clog pipes, drainage stone, and settle out on the bottom of the drain field, accelerating clogging of the infiltrative surface (bottom and side walls of the trenches or bed).

Given the septic industries' focus on regular pumping, its understandable that many owners believe their septic system should provide decades of service, under all conditions, just as long as they get their tank pumped regularly. However, while regular pumping is certainly the single best thing you can do to maintain the health of your septic system, it is not a guarantee of trouble-free septic system ownership.

Onsite sewage treatment and dispersal systems are actually complex biological ecosystems that use naturally occurring micro-organisms (that live in the human gut) to digest and treat sewage. When septic systems get overloaded, either hydraulically (too much water) or organically (too much organic matter in the wastewater) they can back-up or break out on the ground surface. If the microbiology in the septic system gets poisoned by toxins, it can negatively impact treatment performance, or cause the septic system to perform poorly in other ways.

Septic systems can experience malfunctioning or failing due to a huge variety of reasons. Some are related to design or installation problems, some are due to equipment failing or wearing out, some occupant or user related, and some age or weather/climate related. Sometimes it is no one's "fault", and everyone learns something new.

Here is a partial list of just some of the things that can cause an onsite sewage system to malfunction, back-up, break-out on the ground surface or otherwise fail. These are grouped under one of four main categories, however, some items could fall under more than one category.

1. User/Occupant or Maintenance Related:

- Inadequate pumping of the septic tank or other lack of maintenance
- Hydraulic overloading from using too much water
- Hydraulic overloading due to leaky plumbing fixtures, especially toilet flappers that generally need replacing every 5 years)
- Hydraulic overloading due to connecting roof downspouts, sump pumps, etc. into the septic.
- Excessively dirty (clogged) septic tank effluent filter or screened pump vault
- Homeowners or guests doing too much laundry on the same day
- Homeowners or guests putting harmful products down the drain (eg. paint, paint thinner, other toxins, excessive bleach or anti-bacterial soaps, quaternary ammonia based cleaning products, kitty litter, etc.)
- Occupants on prolonged antibiotics or chemotherapy (can kill the good microbes in septic tank)
- Solids getting into drain field, organic overloading from not pumping tank often enough
- Overuse of a kitchen sink garbage disposal (in Canada aka a "garburator"). This increases the organic content of the septic tank effluent which can accelerate clogging of the drain field.
- Putting too much fat, oil, grease down the drain
- Poor landscaping or management of surface water/drainage
- Discharging water softener brine into the septic system
- Driving or building over parts of the septic system
- Using toilet paper that does not break down well
- Using so-called "flushable" wipes (don't flush them!)
- Using excessive amounts of laundry powder that does not dissolve well
- Excessive lint from laundry clogging the drain field (there are economical lint filters than can prevent this)

2. Age or Climate Related:

- General aging of system. The soil loading rates in some (not all) codes and designs are too high to be sustainable and will eventually result in failure from excessive biomat build-up on trench bottoms or sidewalls.
- Progressive clogging/failure due to gravity, trickle-fed distribution.
- Clogging of drain field stone
- "Mud puddle effect" from fines in the drainage stone being washed off by effluent, then deposited

at the infiltrative surface, causing a low permeability, hydraulically limiting layer.
- Heavy rainfall or snow melt resulting in soil saturation
- Groundwater levels rising due to extreme weather/climate change
- Frost heave (can separate or rip access risers from tanks, allowing infiltration)
- Root intrusion into pipes, drain field

3. Component or Equipment Related:
- Leaky tank (cracks in concrete tanks, gaps in mastic used to seal seams, deforming or punctures in plastic tanks), leaking gaskets, access riser connections or seams not watertight allowing infiltration or exfiltration (which can cause well contamination)
- Pump failure
- Aerator/blower failure
- Advanced treatment system not performing as expected (discharging poor quality effluent to drain field or the environment)
- Distributing valve malfunction (eg. spring breaks, debris inside valve, back pressure on valve, etc.)

Unfortunately, some septic problems relate to errors in the sizing or design or defects in the installation of the septic system. If you are getting ready to invest in a new septic tank or drain field, the following checklist may be helpful to ensure your system doesn't turn out to be problematic or fail prematurely.

4. Design/Installation/Construction Related:
- Dirty sand or septic fill not meeting specs (too much clay or silt, or wrong gradation)
- Dirty drainage stone/gravel
- Compaction of native site soils or fill (e.g. by driving over drain field area with tired vehicles) before drain field is installed
- Differential (uneven) settlement of septic fill - can be caused by end-dumping fill in thick layers, rather than spreading fill in thin "lifts", and consolidating with tracked equipment
- Drain field products (e.g. chambers) settling into loose septic fill
- Incorrect soils/site assessment, wrong soil type, permeability
- Incorrect groundwater table assessment (Groundwater table higher than anticipated)
- Inappropriate *soil loading rate* for the soil or fill type (incorrect system sizing)
- Installation deficiencies (trenches not level, pipes settling, tanks settling)

- Components not watertight, allowing groundwater or surface water infiltration (eg. cracked leaky tanks, leaking risers or riser connections, seals, gaskets, etc.)
- Tank installed in a high groundwater table without adequate anti-flotation ballast to prevent uplift.
- Poor landscaping or management of surface water/drainage
- Components not designed to be protected from freezing conditions (e.g. pipes not designed/installed to drain, and/or pipes above frost line which stay full between doses without adequate soil cover or equivalent rigid insulation).
- Insufficient primary treatment, inadequate hydraulic retention time (septic/primary tankage volume insufficient)
- System not designed for the right flows (average and peak daily flows, peak instantaneous flows)
- System not designed for the particular wastewater characteristics (e.g. high strength wastewater from restaurants, food processing facilities, etc.)
- Improper distributing valve design/installation, eg. excessive back-pressure on valve, not enough flow, air pockets, wrong cam.

If issues come up, its better to catch them early, rather than wait until a small problem leads to a malfunction, or worse, a full blown failure. Rising liquid levels in one or more parts of the drain field are a strong indication the capacity of the drain field is being exceeded. Early intervention can often prevent the need to replace the entire drain field, usually the most expensive part of the system.