

DE-CENTRALIZED SANITARY SYSTEMS VS. CENTRALIZED SANITARY SYSTEMS (Part I)

How's that for an attention-grabbing title? When you write monthly articles, it's important to select a topic that affects a majority of your readership to secure their immediate attention. Who could possibly find a topic with more impact than this in our current financial and geo-political climate? Every day in the news we hear more and more about de-centralized sanitary systems, right? Clearly, that isn't the case. However, I have made a conscious decision to write a couple articles this summer about engineering topics for two reasons. The first one is that I am about sick of hearing all the other news, and the second is that this isn't a political publication, and I'm afraid if I get started down that road I won't be able to stop.

As a result, you all will be able to read about a topic that really does impact your everyday lives, even if you don't know it. Without further ado, here goes:

A SHORT SANITARY HISTORY

In order to compare these two sanitary systems, we have to have an

understanding of them-and how we got to this point, so a brief history of sanitary systems is necessary.

A long-long time ago when human beings were nomadic in nature (as some still are on this planet), our sanitary systems included only one object: the nearest tree. There was no reason to collect or treat our human waste, because we weren't going to be at this location tomorrow, anyway.

A long time ago, as we began to farm and collect humans into small communities, our human waste became something of an issue. You couldn't just go out behind the house to the same tree day after day without dealing with the mess so we developed an ingenious method of dealing with this problem. We dug a hole. These holes developed odor and pest problems, but it beat having a mess by every tree in your yard. In villages and towns and cities, however, having one of these holes in the back yard of every home started becoming a problem. The odors and pests multiplied

and nobody was enjoying the outdoors, so a new sanitary system was developed.

A short time ago, we decided to extend our storm piping system to every home in our cities and towns so the sanitary waste could be collected and dumped in the nearest stream. (This only became possible after each home had a water supply and the toilet was invented.) The stream would then transport the sewage away from our town and we wouldn't have to worry about it any longer. Our rural citizens usually extended a tile to the house to transport their sewage to the nearest stream. Any guesses about when the first "modern" sanitary collection system was developed? An English watch maker named Alexander Cummings patented the forerunner to our water-activated toilet in 1775. The first one-piece china toilet wasn't patented until 1875.

This program worked pretty well until we noticed that the rivers and streams we were using for water supply were getting very dirty and all the fish were dying off. That's when we decided to try to clean up



FORT WAYNE WASTE WATER TREATMENT PLANT

SANITARY SYSTEMS....CONT.

that sanitary sewage before we dumped it into the rivers. Any guesses about when the first waste water treatment plant (WWTP) was constructed and put into service in the USA? My research indicates the earliest WWTPs were constructed around 1900 in the major metropolitan areas, but most WWTPs in the USA weren't built until 1940-1975. Can you believe it? We've only had sewage treatment in most of this country for about 50 years. That's hard to believe, but true.

Our rural citizens haven't had access to these WWTPs, however, because there haven't been any pipes extended to their homes to transport the sewage to the centralized WWTPs. These rural areas have utilized another method to clean up their sanitary sewage, the de-centralized waste treatment system--commonly referred to as the septic field. The purpose of the septic field is to keep the sanitary effluent out of the surface waters, protecting humans and wildlife, and also out of the ground waters which supply drinking water to many of us. The other major benefit is that your yard doesn't smell like an outhouse, if the system is working properly.

Now that we know the history of the two systems, let's look at their function.

DECENTRALIZED TREATMENT

A functional septic field system is not just a septic tank and septic field, although those are two of the major components. The septic system actually "treats" the sewage, breaks it down, and disposes of it in a safe manner.

The first component of a septic system is the septic tank. The tank receives the raw effluent from the home. Tanks are designed to be a settling basin where the solids that come from the home can drop out of the effluent stream and nearly-clear water can pass through to the septic field. The tanks will also be the home of billions of micro-organisms that eat away at the solids, reducing them to waste gases and water. These micro-organisms are typically anaerobic in nature (which means they work in the absence of oxygen.)

After the nearly-clear water leaves the septic tank it is transported by pipes (and/or pumps) to the septic field-or leach field. The leach field also provides a home to billions of micro-organisms, but these are typically aerobic in nature and use the oxygen they get through the thin covering of soil over the leach field. These micro-organisms eat as much of the solids that are still in the wastewater as they can. The perforated pipes in

the leach field are imbedded in a granular material that disperses the water to the edges of the trench. The edges of the trench will also be coated with a mat of micro-organisms that will eat whatever is left and filter the water before it enters the soil.

If anything other than water makes it through all of these eating machines, then the soil itself will filter the remaining contaminants out of the effluent before it reaches any ground water or surface water sources.

Proper function of the septic system is dependent on many different factors. First of all, the system has to be designed to handle the amount of effluent coming from the home. For example, a septic tank that is too small for the amount of effluent generated by the home will result in solids not settling to the bottom of the tank and ending up in the leach field. Too many solids in the leach field will overwhelm the micro-organisms and cause them to multiply too quickly, effectively sealing off the leach field and ruining its ability to percolate water into the soil.

Next month's issue will continue this exciting topic.

See you then.....



CAN YOU SEE THE SEPTIC FIELD FINGERS?



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