You and Your Septic System

Part III - Advanced Treatment Wastewater Systems

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Note: This is the third in a series of articles. The first article describing conventional septic systems appeared in the October, 2010 HALO newsletter. Last month's discussion was about septic system maintenance, troubleshooting and upgrading.

Conventional septic systems, consisting of a septic tank followed by a soil absorption system, are the preferred on-site wastewater disposal system for most lots and homeowners because they are inexpensive to install and require a minimum of maintenance. When properly installed in suitable soils they can provide an adequate level of wastewater treatment for many years. However, the septic tank in a conventional on-site wastewater disposal system provides only primary treatment (settlement of solids), but little biological degradation. This means that the soil absorption field receives a significant load of suspended solids. Not only are these suspended solids potentially high in harmful bacteria and pathogens, they also clog up the pores of the native receiving soil, eventually causing the system to fail. To minimize potential contamination of wells and surface water by conventional septic systems, regulations require large (100-foot) minimum separation distances between them. This has the effect of severely limiting the places on a lot where a conventional septic system can be installed.

Until recently, whenever a site for a conventional on-site wastewater disposal system could not found on a lot, due to poor soils, shallow groundwater or insufficient separation distances, the only on-site wastewater disposal alternative approved by the Municipality was a holding tank. As discussed in the previous article, holding tanks are very unpopular, both because of the on-going cost of pumping, and because they significantly decrease the value of a residence. Clearly other options are needed.

Advanced treatment wastewater systems (ATS):

Advanced wastewater treatment systems are designed to provide a significantly higher level of wastewater treatment in a controlled environment than is provided by a septic tank. When properly designed and operated, the effluent from an ATS is much lower in harmful bacteria and pathogens and has much less suspended solids that clog up a soil absorption drainfield. This means not only that the soil absorption drainfield can be smaller, but also the separation distances can be safely reduced.

A number of companies worldwide and in the 'lower 48' have been manufacturing and selling advanced treatment wastewater systems for many years. Most of these are proprietary technologies, some of which have undergone a rigorous testing program administered by the National Sanitation Foundation. The biggest drawbacks to wider ATS acceptance is that they are expensive to install and often do not receive the level of on-going monitoring and maintenance that their technological complexity requires. When an ATS fails due to lack of maintenance it can create a worse public health problem than failing conventional septic systems. For this reason, plus legitimate concerns about ATS treatment performance in a cold climate such as ours, regulators have been justifiably cautious about permitting their use in Anchorage. However, starting in 1993 the Municipality initiated a pilot program to demonstrate and test the performance of specific ATS technologies in Anchorage. Since then it has developed strict regulations governing the ATS testing and approval process and on-going maintenance requirements.

Intermittent Sand Filters:

The first ATS installations approved in Anchorage were Intermittent Sand Filters (***ISF***). In essence, an ISF is a large sand filter that is installed between the septic tank and the soil absorption system, which provides a high level of treatment before the wastewater is discharged. Typical ISFs have an area of 360 square feet and contain 2 feet of carefully graded coarse sand and include an aeration system to promote biologic breakdown of wastewater constituents. Extensive testing of pilot installations showed that the effluent from a properly functioning ISF is far cleaner than septic tank effluent. An ISF is not a proprietary system developed and supported

by a specific company, so their functionality is highly dependent on the care and professionalism with which it is constructed and maintained. Unfortunately, there have been a number of ISF failures in Anchorage (usually due to the top surface of the sand filter becoming clogged), and the Municipality has had difficulty ensuring regular monitoring and maintenance.

Suspended aeration package treatment units:

In 1994 a second ATS called the "***Biocycle***" was introduced to Anchorage. In essence this system consists of a 4-compartment, suspended aeration, wastewater treatment package plant that replaces a conventional septic tank. Test results indicate that the Biocycle is capable of producing effluent meeting secondary treatment standards, which makes it suitable for similar applications as the ISF. The company manufacturing and distributing Biocycle units in Alaska has an excellent track record of performing quarterly on-site inspections and servicing of all of their systems. Numerous other companies in the lower 48 manufacture similar suspended aeration package treatment plants; however as of 2010 none have gone through the required approval and testing process to market their units in Anchorage.

Packed Filter Beds:

Starting in 1996 Orenco Systems (a large wastewater technology company based in Oregon) teamed up with Anchorage Tank to demonstrate, test and market Packed Filter Bed technology in Anchorage. It has been an evolutionary process, starting with initial models called Recirculating Trickling Filters. These early models morphed into a unit called Reactex, which ultimately morphed into ***Advantex***.

Basically, an Advantex system consists of a 2-compartment septic tank with a pump in the second compartment that intermittently pumps a portion of the fluid in the second compartment up into an aerobic treatment module containing dangling strips of fibrous media. The geotextile strips provide a suitable environment where aerobic bacteria can break down much of the solids in the wastewater into gaseous components and water. The process also removes some of the nitrogen found in wastewater. Test results have demonstrated that effluent from this system generally exceeds secondary treatment standards.

The Advantex system also features continuous monitoring of fluid levels and pump operation via a telephone connection to Orenco headquarters. Thus, any mechanical malfunction is reported immediately to the local service contractor so that repairs can be made – often without the homeowner even knowing there was a problem. Like the Biocycle, the Advantex maintenance system has an excellent track record.

Since approximately 2008 a second Packed Filter Bed system called ***Quanics*** has also been tested and approved for use in Anchorage. Quanics is locally distributed by Greer Tank and Garness Engineering. Instead of suspended geotextile strips, Quanics' treatment module uses open cell foam cubes as the substrate supporting the beneficial aerobic bacteria. Quanics also has a telephone based monitoring system to call the service provider in the event of equipment malfunction. Each of these distributors can provide test data that they assert demonstrates the superiority of their technology.

Part IV in the next newsletter will address on-site ***Neighborhood Cluster Wastewater systems***.

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