

<b>Treatment for Small On-Site Wastewater and Septic Systems</b>
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## **Background**

As more people move to rural and suburban areas not serviced by municipal or community sanitary sewers, the solution for the treatment of household waste continues to be on-site sewage disposal. Household waste in this application includes waste generated at housing units, public facilities and commercial establishments such as restaurants. In addition, many restaurants install grease and oil interceptor tanks located before the septic tank. During normal operation, septic systems and grease and oil interceptor tanks fail due to clogging. The clogging is a function of biomass buildup or grease buildup. In addition, household chemicals flushed down a toilet or sink often contaminate a leach field and the subsurface soils and groundwater resulting in significant liability for the property owner. Contaminated leach fields are very expensive to remediate using conventional treatment technologies.

Waste includes fats and oils, grease, sludge, human waste, food/garbage disposal waste, and laundry effluent. Conventional wastewater treatment processes are microbiologically mediated. Butane, having the highest solubility of all the alkanes, can be used to control BOD, TOC, TDS as well as priority pollutants typically found in wastewater through enhanced growth of aerobic bacteria and other microorganisms that oxidize dissolved organic matter and sludge effluents thereby significantly decreasing the sludge and BOD of a wastestream.

The most common form of on-site sewage disposal employs a septic tank/soil absorption system. A conventional septic system consists of a septic tank, distribution box, and a gravel-filled absorption field installed below the soil surface. The process flow occurs as follows: (1) Household wastes are collected in the septic tank. (2) The septic tank retains the wastewater for approximately 24 hours, allowing the solids to separate and settle out. This allows bacteria to partially decompose and liquefy the solids. (2) A scum layer, consisting of fats and oils, floats on the surface of the wastewater. Heavy, partially decomposed solids, sludge, are retained in the septic tank and must be pumped out periodically. (4) The partially treated liquid, called effluent, flows out of the septic tank to the distribution box, where it is evenly distributed throughout the absorption field. (5) As the effluent moves through the soil, impurities and pathogens are removed.

## **On-site System Components**

The principal components of the most common type of on-site wastewater management systems for individual residences and other establishments include: septic tanks, grease interceptor tanks, Imhoff tanks, disposal fields, disposal beds and pits, intermittent sand filters,

recirculating granular-medium filters, shallow-trench sand-filled pressure-dosed disposal fields, mound systems, complete recycle units, and graywater systems. Naturally occurring anaerobic bacteria breakdown and digest the solid waste that falls to the bottom of the septic tank. The microbial processes acting on the solids in the tank reduce the solids to gases and fine particles. These small solid particles, as well as the oils and greases, float on the surface of the tank and form a scum layer. In the process of floating to the top of the tank, some of the small solid particles, oils, and greases are forced out by the flow of water into the outlet baffle leading into the drainfield. With time, the buildup of small solid particles, oils and greases, and soaps, can cause serious problems in the drainfield. Clogged drainfields are the most common and expensive problems facing septic system owners.

Decomposing wastes in the septic tank (anaerobic processes) produce toxic gases that can kill a person within a matter of minutes. This gas is hydrogen sulfide that is only produced under anaerobic conditions. Hydrogen sulfide is also corrosive to tanks and piping networks.

### **Conventional Treatment**

The addition of micro bubbles of oxygen has been demonstrated to enhance the aerobic treatment of wastewater to lower biological oxygen demand (BOD), total dissolved solids (TDS) and total organic carbon (TOC). Aerobic processes tend to work faster and more efficiently than anaerobic processes.

### **Butane Biotreatment**

Global BioSciences, Inc. has developed an innovative treatment system for small on-site wastewater and septic systems. In addition, the process may be used to remediate contaminated leach fields. Essentially, a septic tank will become an aerobic bioreactor using butane and air. Using this method, hydrogen sulfide will not be created, thus the tank and piping systems will last longer than conventional septic systems. In addition, butane and air may be injected into a leach field to improve field performance and into oil and/or grease interceptor tanks to reduce the solids content.