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RESIDENTIAL SEPTIC TANKS

By HANS V. PEDERSEN

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**C**ONFERENCES on sewage treatment are held annually at Iowa State College, under the auspices of the Engineering Extension Department. These meetings are of a practical nature and are arranged for municipal officials and all others directly or indirectly responsible for the operation of sewage-treatment plants.

This publication is one of the more general papers which were presented at the 1924 conference. Several others from this meeting are to be published. In addition to the more formal papers, considerable time on the program was devoted to the consideration of sewage-treatment plant construction and operation, as well as to the individual problems of those in attendance.

## **RESIDENTIAL SEPTIC TANKS**

By HANS V. PEDERSEN

Civil and Sanitary Engineer, Iowa State Department of Health.

In the early history of sewage treatment, it was heralded far and wide that a wonderful discovery had been made which would forever solve the problem of destroying objectionable waste matter. This discovery consisted of an air-tight box-like affair, and it was called a septic tank. So well was this invention advertised, and so thoroughly were the supposedly marvelous changes which took place inside the septic tank impressed upon the minds of that generation, that even to-day it is commonly accepted as a fact that a septic tank of any size and located in any place will convert the most foul sewage into a harmless and perfectly pure effluent.

### **Limitations of Septic Tanks**

Regardless of whoever might be blamed for the forming of this early public opinion, engineers and professional men of to-day, who have been in close touch with public-health work, know that the first assumptions regarding the efficiency of septic tanks were erroneous, and that the uses to which a septic tank can be put successfully are somewhat limited.

It was at first generally accepted and understood that a septic tank constituted in itself a complete sewage-treatment plant. We know today that this is not true, and that in reality the septic tank, or any one of the various types of sewage-treatment tanks, accomplishes only the first step in the complete process of purification. When properly designed as one of the units of a municipal sewage-treatment plant, such tanks have proved successful; but many of the privately-owned septic tanks, as commonly installed for residential purposes, generally have not proved successful. In many cases they have even tended to aggravate unhealthful conditions. For this reason the Iowa State Board of Health does not approve of the residential septic tank as a permanent method of sewage disposal for cities and towns. In fact its attitude is to discourage the installation of residential septic tanks in all towns with more than 200 population, or in all towns where the installation of sanitary sewers is at all possible.

The only approved permanent method for disposing of sewage is the sanitary sewer system that includes a municipal sewage-treatment plant. All other methods, not disapproved entirely, are considered merely as temporary means for disposal. An outdoor toilet is considered an approved temporary method for sewage disposal, provided the vault has been constructed water-tight and the superstructure fly-proofed and well ventilated, but only so long as no

sanitary sewer is available. As soon as a sanitary sewer is available all outdoor toilets in a community should be abandoned and destroyed.

### **Leaching Cesspools**

Leaching cesspools are dangerous, no matter where they may be located, and their construction should be prohibited. Especially is this true in the smaller towns, where the people are dependent upon private wells for their drinking water. Even in those towns which have a public water-supply, the practice of saturating the ground with impurities is not conducive to healthful conditions and should not be permitted. It is well known that underground waters tend to flow in certain definite directions. If the ground beneath a town becomes thoroughly saturated with impurities, such impurities may easily influence the quality of the underground waters. In stony or coarse gravel formations, such as underlie a great part of Iowa, the possibilities of contaminating the water of a municipal well, even if it is located a fair distance away, are greater than ordinarily supposed. The best that can be said of leaching cesspools is that they are most dangerous enemies to the good health of the public. They should be condemned and prohibited in every community, regardless of its size.

### **Residential Septic Tanks**

The residential septic tank is but a slight improvement over the leaching cesspool. The only difference is that the contents of the one seeps away with the full knowledge of the owner, while the effluent of the other seeps away without the knowledge of the owner, usually creating conditions almost as bad. Every septic tank, no matter how water-tight it is, must have an outlet opening. The effluent which passes out of a tank is not pure, no matter how many compartments it may have passed through; it is a foul liquid and as dangerous as the influent. The tank acts merely as a place where the solids are held until they have been reduced or broken up into liquids and gases by bacterial decomposition. It has been estimated that about one-half of the impurities that enter a septic tank pass on through it; and if no other form of treatment has been provided these impurities will seep away into the ground just as do those from a leaching cesspool.

Residential septic tanks should not be installed in the business district of any town, and their installation should not be encouraged in the residential districts unless conditions are most favorable. Every privately-owned septic tank that is constructed in a growing small town makes the possibility of securing a sanitary sewer just a little more remote. A sanitary sewer is one of the cheapest public utilities that can be constructed, but it is a popular opinion that a

town must be of a certain size or be so wealthy before it should construct one.

There are always a certain number of people in every town who desire to modernize their homes and are favorable at first to the installation of a sanitary sewer. When they see no immediate hope for a public sewer, they install private plants at considerable expense. Then, as it works out in many cases, when the town is ready for a sewer the very people who have installed private means for disposal object to the expense of a sanitary sewer, purely from a selfish standpoint. Every small town should guard against the practice of permitting the construction of residential septic tanks to serve only a very small portion of its population, and thus sacrificing the possibilities of installing a sanitary sewer to serve the entire town.

### **Function of Small Septic Tanks**

The septic tank is well adapted for farm use and for small summer resorts or tourist camps, and it can be installed and operated successfully by the consolidated schools in small communities. The residential septic tank may properly be installed in the outlying districts of towns, where the possibilities for a sanitary sewer are very remote and where the outlet is favorable. The effluent from a septic tank should either discharge directly into a considerable body of flowing water or be caused to flow through a sand filter bed. It is seldom that a properly-constructed filter bed can be built on a lot of average size, and it is often very expensive to pipe the effluent to a nearby stream. Thus it is that many residential tanks have been installed with outlets that either cause a public nuisance or tend to contaminate a nearby water-supply with seepage.

### **Attitude of State Board of Health**

The Iowa State Board of Health has taken a definite stand with regard to the installation of temporary means for sewage disposal. When letters are received requesting detailed information concerning the construction of a septic tank in a city or town, such information is generally withheld and a letter sent stating some of the reasons why it is better to turn every effort and all resources toward building an approved sanitary sewer system. No approval is granted on plans for a proposed installation unless a satisfactory outlet for the final effluent is provided. A consistent effort is made to discourage the installation of privately-owned septic tanks in all towns where the construction of sanitary sewer systems is considered possible.

Those municipalities of the state which have adopted the system of making each and every resident responsible for the disposal of

his own waste, either by constructing an outdoor toilet or a privately-owned septic tank, in preference to constructing a municipal sanitary sewer system, are making a big mistake and will sooner or later come to grief. We cannot condemn such individual disposal strongly enough, and in all sincerity we urge the installation of sanitary sewers and municipal treatment plants as the only satisfactory method for the disposal of domestic sewage.