

A Method of Simplifying Soil Percolation Tests For Septic Tank Systems

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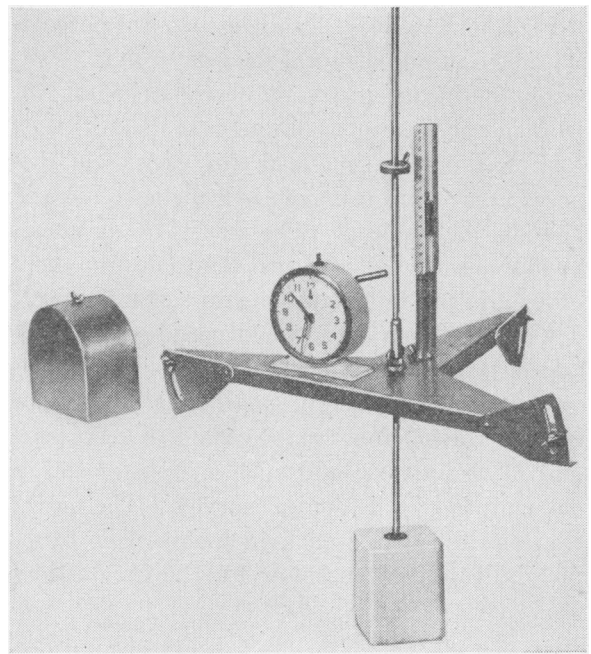
Cities and towns are facing anew the re-crudescence of an old and presumably solved problem—sewage disposal. This problem is particularly acute in fringe areas where there have been marked population growths during the past decade (1).

The mushrooming of new residential and industrial building beyond the limits of common sewage disposal services, both inside as well as outside corporate limits, has led to present and latent health hazards. This state of affairs is of pressing interest to health officers as well as sanitary engineers. Municipal sewage systems, with either new or expanded treatment facilities, are costly. However, long-range planning for the metropolitan area, if possible, is considered to be the least expensive and most efficient procedure (2). Extension of facilities street by street, as neighborhoods petition city councils, is an expediency only. For the health officer this situation entails resolving the results of inadequate past control of individual and area sewage disposal. The rules and regulations needed to insure adequate sewage disposal for the present and future must be promulgated as well. The permanent solution to the backlog of sewage disposal nuisances is extension of present common sewage disposal facilities or initiation of a sanitary district (1-3).

Soil Percolation Test

But of immediate import is the approval by the health department of all buildings that re-

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Automatic soil percolation timer.

quire private sewage disposal, since minimum standards for private sewage disposal systems are a part of State regulations and statutes. One important aspect of this method of control, measuring the water absorption capacity of soil, continues to be a time consuming and thus a costly although necessary procedure. There is general agreement that the determination of the porosity of the soil that is to receive septic tank effluent, in conjunction with other factors such as probable sewage load, land slope, water table level, land area, and water supply, is mandatory in order to insure adequate disposal of the effluent (4, 5). However, the present technique of watching water seep out of a hole in the ground is frequently prohibitive in cost to many health departments, for sanitarians performing such tests cannot perform their other manifold and necessary environmental health services.

It is not pertinent here to discuss the dynamics of the absorption of water by soil. However, reasonably accurate criteria for the efficient and safe disposal of septic tank effluent in a tile field have been evolved, based upon soil percolation tests and the other factors mentioned above (4, 6). The area of a tile absorption field is the minimum required for the probable maximum sewage load.

Field experience has shown that soil percolation tests in one disposal field as well as in adjacent building sites may vary markedly (7). In fact, our present technique is to make at least four soil percolation tests for each field disposal area; each test hole is 8 inches wide and 27 to 30 inches deep. The results of such tests in just one Des Moines real estate development of 30 adjacent lots, requiring septic tank sewage disposal systems for 2-3 bedroom houses, illustrated the variability of soil water absorptive capacity in a relatively small area. The lots, each with a 100-foot front by 200 feet deep, were on rolling pasture land with a Webster soil as determined by a geological survey. The feet of tile required in a trench 18 inches wide by 30 inches deep is given below for the various lots.

<i>Feet of tile required</i>	<i>Number of lots</i>	<i>Per-cent</i>
144 (minimum)-----	0	0
162-198-----	10	33
211-299-----	9	30
300-399-----	7	23
403-480-----	4	14

This is but one example which emphasizes the necessity of soil porosity tests even for adjacent building lots.

Automatic Timing Device

A drawback to the soil percolation test, watching water seep out of a hole in the ground, has been satisfactorily solved by the use of a simple, inexpensive, automatic timing device. The instrument was constructed by our director of the bureau of environmental hygiene and has had a year of field test to date, verifying its accuracy and ease of utilization. The timers can be set up in a few minutes. The sanitarian can then leave the test fields to perform the other functions of a sanitarian. He returns in the late afternoon to pick up the timers and record the percolation times.

A total of 408 absorption fields for 2-3 bedroom houses scattered throughout Des Moines have been tested during the past year, and the following table presents our results, utilizing an automatic soil percolation timer.

<i>Total time needed for 6 inches of water to percolate (minutes)</i>	<i>Number of tests</i>	<i>Average time required for percolation (hours)</i>	<i>Feet of tile required</i>
24	0	0	144
30-60	126	95	162-198
66-120	115	178	211-293
126-240	88	264	300-399
246-360	55	275	403-480
>360	24	144	refused
	408	956	

It is considered that approximately 956 man-hours have been saved by utilizing an automatic timing device, since the time required to set up the devices for the percolation tests is not appreciably longer than preparation for the tests used in present practice. We have had no problem of tampering with the device for several reasons. We know from geological survey data (7) the types of soils in the area and, roughly, their absorptive capacities. The health department program of prevention of septic tank sewage disposal malfunction has been coordinated with interested groups such as the home builders association, real estate board, master plumbers association, zoning boards, mortgage and loan associations, and public officials. Community groups have also been alerted to the available public health service. An intensive educational campaign is a mandatory requirement.

Construction

The percolation timer, constructed of aluminum, consists of a base plate that will rest over any size percolation hole and has legs that will adjust the base to a horizontal position. On the plate is a rugged clock that fits snugly against the stops on the plate. To its rear is the trip mechanism which stops a sprocket wheel when the trigger arm is depressed. The clock has a housing to protect it from rain. The ruler post is fastened upright when in use, and the bottom of the ruler is set at the same height as the top of the trigger arm. The clock is set at noon; the float which has been inserted through the sleeve is assured of free movement by leveling the base. The round tripping ring is screwed tight at the point on the float rod opposite the top of the ruler, thus

setting the mechanism to automatically trip the trigger when 6 inches of water have been dissipated from the test hole. It is seen that the fall of any water column height can be automatically timed. The float is a cellulose compound and standard equipment as a water closet float. With this mechanism, two extra inches of water are used to compensate for water-swollen earth on the bottom of the test hole as well as the level of the float below the surface of the water column, a total of 8 inches of water. Presoaking the test holes 12 hours before the tests is a part of the routine. The reasons for this latter part of the procedure have been adequately presented elsewhere (5, 8, 9).

This automatic percolation timer permits a health department to perform accurate soil percolation tests in many more areas than possible with the present technique. It adds to the officialness and thus the acceptance of the percolation time as an important adjunct to the planning for private sewage disposal systems. And most important, the timer permits health department environmental sanitation personnel to resume other environmental health service functions.

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Federal Food and Drug Laws Violated

The Food and Drug Administration of the U. S. Department of Health, Education, and Welfare reported 119 seizures of food and drug shipments during April 1953. All were civil actions to remove products from the market before they reached the consumer.

One permanent injunction and 27 fines against individuals and firms were also reported during April. One of the fines, \$850, was imposed against an unlicensed operator of a treatment center in Kentucky. Through a "runner" in St. Louis, he supplied worthless herb medicines for out-of-State use to patients, mostly from midwestern States, whom he had diagnosed without physical examination. Several appellate courts have ruled in similar instances that the Federal Food, Drug, and Cosmetic Act is violated when misbranded medicine is offered for interstate transportation even though the "doctor" did not make the shipment.

Establishment of definite responsibility for violating the Federal food and drug laws may mean criminal prosecution for the alleged violator, the Food and Drug Administration has warned.