July 22, 1999

To: Environmental Health Managers
Health Directors
Virginia Tech Contract Soil Scientists
OEHS

From: Donald J. Alexander, Director
Division of Onsite Sewage and Water Services

Subject: Use of Gravel-less systems **GMP #102**

Attached is GMP #102 which is an interpretation of the trench design requirements in the *Sewage Handling and Disposal Regulations*. GMP #102 addresses the use of gravel-less trench construction methodologies using a variety of proprietary products.

Previously, the Division has issued product-specific approvals. Providing timely product approvals has proven to be an inefficient use of resources. Effective immediately, all gravel-less systems shall be considered under this policy and those complying with it may be used in conformance with the criteria contained in the policy without having a product-specific approval.

PC: Envirochamber
Infiltrator Systems, Inc.
Cultec

Gravel-less Systems
Conditions for Use
GMP #102,

Introduction

The Sewage Handling and Disposal Regulations specify use of clean crushed stone or gravel to bed the percolation lines in trenches. However, there are other means to bed the percolation lines that do not require the use of crushed stone or gravel. These means may be grouped as gravel-less systems. There are a number of companies that manufacture systems such as chambers, large diameter pipes, multi-pipe systems, and various aggregate substitutes that may be used in trenches instead of clean crushed stone or gravel.

Such systems have requested and received approval in the past without any reduction in size of the trenches. This policy is intended to provide guidance on the design, use, and application of gravel-less systems in Virginia regardless of manufacturers for such systems. GMP #64 (Use of Infiltrator and Envirochamber chamber systems) and GMP #86 (Use of Cultec chamber system) are rescinded effective with the adoption of this policy. GMP #91 (Use of Tire Chips), while consistent with this policy, remains in effect because of the reporting requirements associated with the use of tire chips.

System Description

Gravel is used in conventional septic tank effluent trenches to allow for storage volume necessary to hold the effluent that is dosed in the trenches and to provide for the necessary soil interface at the bottom and side walls of the trench. The surface area made available by the gravel may allow for some treatment of septic tank effluent before the effluent is absorbed by the soil surrounding the gravel. However, it is the soil present surrounding the gravel that primarily provides the necessary treatment of the septic tank effluent. Thus, it is very important to have adequate surface area at the soil-gravel interface in the trenches. Section 12 VAC 5-610-1090-C specifies the total absorption trench bottom area required based on the average estimated or measured percolation rate for the soil horizon(s) into which the absorption trench is to be placed. The total length of trench necessary for given flows is determined based on the required trench bottom area and the width of the trench. The width of the trench could be between 18 inches to 36 inches for a gravity distribution system, or could be between 8 inches to 24 inches for a low pressure distribution system.

Systems that are manufactured and marketed as alternative to a gravel system typically fall under two categories – chamber systems and pipe systems. Chamber systems when used in a trench provide for a void space that allows for storage volume and also provide for soil interface at the bottom and side of the chamber. Pipe systems

may use some type of plastic media surrounding the pipe that acts like gravel to offer the storage volume and the soil interface in the trenches. Pipe systems that do not use any media still offer the necessary void space for storage of effluent and the necessary soil interface at the bottom and side of the trench. Both the systems must have a perforated pipe along the length for adequate distribution of the effluent in the trench. Such a perforated pipe may be pre-installed in the system or installed in the field during the construction.

Scope of Policy

All previously approved and new products designed to replace gravel may be used in accordance with this policy. This policy addresses all gravel-less systems for the domestic strength sewage regardless of the design flows, including but not limited to chambers, large diameter pipes, multi-pipe systems, and various aggregate substitutes.

Submission of Plans

Formal plans may be required as specified by the Section 12 VAC 5-610-240 or when a gravel-less system is to be installed under a parking lot or other situations where there is potential for traffic over the trenches.

Site and Soil Requirements

All sites where gravel-less system is utilized shall meet the site and soil criteria contained in the Sewage Handling and Disposal Regulations.

Absorption Area Size

All gravel-less systems shall be sized based on actual bottom area and shall be equal to a conventional gravel system in square footage of bottom area. Absorption area for gravel-less systems shall be sized as per Section 12 VAC 5-610-1090 with the following guidance:

- The trench bottom area necessary for a given site shall be determined based on the design flows and the estimated or the measured percolation rate for the site.
- The total length of the trench shall be determined by dividing the total trench bottom area by the “effective width” of the proposed gravel-less system.
- The “effective width” of a gravel-less system typically is the actual inside width of a chamber, the actual diameter of a pipe, or the sum of the diameters of the pipes that would be placed on the bottom of the trench. In those instances where

the "effective width" is in dispute, the Division of Onsite Sewage and Water Services shall establish the "effective width" to be used for design purposes.

- The side walls of any gravel-less system will NOT be considered in determining the "effective width" of that system or in determining the square footage of soil interface per foot of the gravel-less system.
- The "effective width" of a gravel-less system may be less than the width of trench in which the system is installed. However, in that situation the total length of the trench will be determined based on the "effective width" and not based on the trench width. For example, total length of trenches for a chamber system that has inside width of 30 inches and is proposed to be installed in a 36 inches wide trench should calculated based on 30 inches "effective width" and not 36 inches the trench width.
- The maximum allowable "effective width" for a gravity distribution would be 36 inches and for low pressure distribution would be 24 inches. All the gravel-less system must have at least 8 inches of height and must have perforated pipe either pre-installed or ability to install in the field distributing effluent along the length.
- A gravel-less system that uses plastic or other type of media must allow for the storage capacity that is substantially equivalent to that available in a gravel system. And, the media used must be inert to the effluent that is discharged into the system.

Other Requirements

The manufacturers of gravel-less system must have clear instructions for installation of their products and they must train and certify the installers for installing their products. Only those installers that are authorized in writing by the manufacturer and are licensed to install sewage system in Virginia can install the gravel-less systems.

All the gravel-less system must have at least H-10 load rating when installed according to manufacturer's instructions in non-traffic area. H-20 load ratings may be needed when the system is installed in traffic area. It will be the manufacturer's and project engineer's responsibility to verify and approve the use of the gravel-less system from the structural integrity point of view whenever necessary.