



Missouri Department of Health and Senior Services

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TO: Local Public Health Agencies and other local Wastewater Regulatory Agencies

THROUGH: Dustin Johnson, Chief 
Bureau of Environmental Health Services

FROM: Eric C. Folks, Manager 
Onsite Wastewater Program

SUBJECT: Use of Gravel Pits for Dispersal of Effluent

DATE: June 16, 2023

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It has come to the attention of the Department of Health and Senior Services (DHSS) that the use of gravel pits has been proposed for the method of distributing effluent in lieu of dispersal fields. Prior to the inception of the onsite wastewater regulations in 1996, gravel pits were commonly used throughout the state. Under today's regulations they do not meet the State Minimum Construction Standards, as described in 19 CSR 20-3.060.

Historically, gravel pits were installed with various sizing parameters and in all types of soil. The common misconception was to dig the pit deep enough and have enough gravel in it that the effluent would eventually seep downward out of the pit and not surface. When a gravel pit was found to be surfacing, it was not uncommon to replace the failing gravel pit with another. The problem with this method of disposing wastewater into the ground is the effluent is not properly treated before being reintroduced into groundwater, resulting in a potential health hazard.

All onsite wastewater systems, with the exception of lagoons, require a dispersal field to provide final treatment of the effluent. Dispersal fields are sized in a manner to provide adequate unsaturated soil conditions to allow the effluent to stay in contact with well aerated soil for sufficient time to receive biological treatment. If effluent moves through the soil too rapidly (as is the case with gravel pits), effluent does not bind to the soil and treatment is not complete.

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Vertical separation is known as the amount of *suitable* or *provisionally suitable* soil between the bottom of the trench and a limiting layer in the soil. It is in this unsaturated area that pathogens can become neutralized over time due to changes in temperature, moisture, lack of food and other factors so they do not contaminate groundwater. The soil also treats the effluent by converting and/or removing some of its nutrients, mainly nitrogen and phosphorus. Nitrites can be used by growing plants through root uptake; however, nitrites also move with groundwater and can contribute to health and environmental concerns.

Under current regulations, the minimum amount of vertical separation for conventional systems is 24 inches and the minimum amount of vertical separation for most alternative systems is 12 inches. The difference in the amount of vertical separation required is due to both the treatment of the wastewater and the distribution of the effluent. Most alternative systems require secondary (aerated) treatment of the sewage before being introduced into the soil. All alternative systems utilize pressure distribution of the effluent into the soil. Pressure distribution systems have multiple points of dispersal that allow the effluent to be distributed throughout the entire trench which reduces the chance for saturated conditions; whereas gravity dispersal distributes effluent into only one end of a trench. Research has shown that the greater the vertical separation, the better the effluent is treated. Introducing untreated or partially treated effluent into a saturated pit on a daily basis does not allow for aerated treatment. This could potentially lead to ground water contamination or the surfacing of effluent, resulting in a potential health hazard.

Section 6(K) of 19 CSR 20-3.060 allows an engineer to design a system that is not specifically mentioned in rule. This section allows for special systems of treatment and disposal to be considered provided six (6) requirements are met. After review of the engineered gravel pit design submitted to DHSS, it was determined that parts 1, 3, 4 and 6 of section 6(K) were not met.

Because the use of gravel pits cannot meet the requirements listed above, as well as others (such as sizing requirements of trenches/beds) DHSS does not, nor would we recommend other agencies approve their use for the dispersal of effluent.

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