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DIRECTOR'S JOURNAL ENTRY

APPROVAL OF DRIP DISTRIBUTION TECHNOLOGY AS A SPECIAL DEVICE FOR SEWAGE TREATMENT SYSTEMS IN AREAS WITH SIX (6) TO TWELVE (12) INCHES OF IN-SITU SOIL ABOVE BEDROCK

Under the authority of rule 3701-29-20(C) of the Administrative Code, the Director of Health may approve special devices or systems that differ in design or principle of operation from those set forth in the rules. The standards and criteria for drip distribution technology in areas with six to twelve inches of in-situ soils above bedrock is attached to this entry and have been reviewed and recommended for approval by the Sewage Treatment Systems Technical Advisory Committee for use as a sewage treatment system in Ohio at their meeting on September 9, 2014. Therefore, the use of drip distribution technology with timed micro-dosing and highly pretreated effluent as described in the attachment, and are designed, installed and maintained in accordance with the conditions as specified, are now approved as a sewage treatment system special device for use in Ohio.

9/19/14
Date

Richard Hodges, MPA
Director of Health

I hereby certify this to be a true and correct copy of the Journal Entry of the Director of the Ohio Department of Health.

9/22/14
Date

Brenda M. Adams
Custodian of the Director's Journals
Ohio Department of Health

Ohio Department of Health
Special Device Approval per OAC 3701-29-20(C)
Drip Distribution Technology
for areas with six (6) to twelve (12) inches of In-Situ Soil Above Bedrock

In accordance with Am. Sub. HB 119 (127th General Assembly), effective July 2, 2007, the Ohio Department of Health (ODH) adopted Statewide Interim Sewage Rules that reflect the language in the 1977 version of Ohio Administrative Code (OAC) Chapter 3701-29. Due to this action and the rescinding of the 2007 sewage treatment system rules, the rule provisions for use of drip distribution and related assurances were eliminated. Provisions in OAC Rule 3701-29-20(C) do provide the means for securing continued use of drip distribution. The rule reads as follows:

Household sewage disposal system components or household sewage disposal systems differing in design or principle of operation from those set for the in rules 3701-29-01 to 3701-29-21, may qualify for approval as a special device or system; provided, comprehensive tests and investigations show any such component or system produces results equivalent to those obtained by sewage disposal components or systems complying with such regulations. Such approval shall be obtained in writing from the director of health.

Am. Sub. HB 119 amendments to Ohio Revised Code Chapter 3718 still include the Technical Advisory Committee (TAC) process of reviewing systems and components that differ in design and function from those in rule. With consideration of TAC recommendations, ODH grants special device approval for the use of drip distribution as a component of a sewage treatment system (STS) that is fully supported by a responsible party providing assurances in accordance with the conditions, specifications, and other provisions set forth in this document. Local health districts using this special device approval shall have a letter of verification from an Ohio Department of Health Approved Assurance Party that the design conforms with this special device approval prior to issuance of a an installation permit for this special device approval drip distribution STS

CONDITIONS:
The following conditions shall be met to comply with this approval:

1. To be used only for replacement systems or for lots created prior to January 1 2007

2. Can only be used where site conditions have a soil thickness range of between six (6) and twelve (12) inches over bedrock

3. Use only Ohio Department of Health Approved Drip Distribution Assurance Parties.

4. Only pretreatment unit(s) that treat effluent to less than or equal to one thousand

(1,000) cfu/100 mL or two-hundred (200) cfu/100 mL shall be used in accordance with this SDA.

5. The combined thickness of suitable in-situ soil and sand media shall be at least eighteen (18) inches. For purposes of this SDA, highly permeable materials within the in-situ soil are not considered suitable for the minimum thickness therefore there will be a total of eighteen (18) inches of suitable soils and sand media needed when highly permeable soils are present

6. When highly permeable soils are present in the in-situ soils, a pretreatment unit that pretreats effluent to 200 fecal coliforms per 100 milliliters shall be used

7.Highly permeable soils means a layer through which effluent is expected to pass too quickly to provide adequate treatment, such as:

(i) Soils with greater than fifteen per cent rock fragment size particles and a soil texture of: loamy sand, loamy coarse sand, coarse sand, sand, fine sand or very fine sand;

(ii) Soils with greater than sixty per cent rock fragment size particles and the spaces between the rock fragments are filled with air, or soils other than fine textured soil; or

(iii) Any other layer deemed by the site and soil evaluator as highly permeable material.

8.When using this technology in areas with six (6) to twelve (12) inches of in-situ soil then controlled timed micro-dosing at each point of application must not to exceed one quarter gallon per dose and one gallon per four square feet of infiltrative area for each point of application per day (< 0.25 gal/day/ft2). Each dose shall not exceed one eighth of the daily design flow and shall be timed dosed over the day

SITE SPECIFICATIONS:

Site Limitations and Modifications - Siting limitations and site modification include but are not limited to the following:

a) Drip distribution shall be oriented parallel to natural surface contours and shall be sited to avoid natural drainage features and depressions that may hold surface water.
b) Plans shall address surface water diversion as needed. An interceptor drain may be used upslope of the drip distribution components to intercept the horizontal flow of subsurface water to reduce its impact on the down gradient drip distribution absorption area.
c) Drip distribution may be installed on a slope greater than 25% with special safety consideration and installation criteria as needed.
d) Careful consideration shall be given prior to siting drip distribution in settled non-compacted fill material to determine its suitability for soil absorption.

Over time, fill material may develop the characteristics of soil, however, it shall be thoroughly evaluated for such characteristics, in addition to treatment and dispersal capacities.

Site and Soil Information - A site and soil evaluation is required to identify depth to limiting conditions including but not limited to water table and rock strata, and, a description of soils including texture, consistence, structure (both shape and grade), and color.

DESIGN CRITERIA:

Sizing and Configuration - The method and calculations for sizing the soil absorption area shall be included in the design plan with reference to any manufacturer, supplier, or designer specifications but shall not be less than that determined in accordance with the site and soil evaluation information or the maximum loading rate allowable for use of the timed micro-dosing distribution. For the purpose of drip distribution area sizing and configuration, soil loading rates and linear loading rates shall be considered. Resources for estimating loading rates may include the Tyler Table (table available in papers referenced herein) or other resources referenced in the design plan.

The soil absorption component **area** shall be of adequate size and configuration to disperse the effluent and prevent surface seepage. Systems shall be sized based on at least 120 GPD per bedroom or as otherwise justified for daily peak flow variations or for SFOSTS flows per OAC Rule 3701-29-21.

The daily design flow, linear loading rates and soil information establish the minimum **length** and **width** of the drip distribution absorption area along the contour. Drip distribution areas shall be sited, and the drip tubing installed, parallel to natural surface contours. The length of the distribution area along the contour shall be determined by the linear loading rate. When site conditions indicate shallow horizontal subsurface flow, an undisturbed on-lot area of up to twenty five feet shall be preserved below or around the drip distribution area and the designated replacement area.

Design Plans - The design plan shall specify that any disturbance or damage in the drip distribution or replacement areas may result in the invalidation of the design plan. The design plan shall indicate the vertical separation distance from the drip tubing to bedrock to justify the amount of sand media used.

When placement is on sand fill, basal area preparation shall be specified in the design plan. All sand fill shall meet one of the following specifications:

(1) Gradation requirements of ASTM C33, provided not more than five per cent passes the No. 200 (75 μm) sieve as determined by ASTM C117, "Test Method for Material Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing".

(2) Having an effective size between 0.15 to 0.3 millimeters, a uniformity coefficient of 5 or less, with not more than five per cent passing the No. 200 (75 µm) sieve as determined by ASTM C117, "Test Method for Material Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing" and not less than eighty per cent passing the No. 8 (2.36mm) sieve.

Cover material and depth specifications including precautions for freeze protection of the entire distribution system shall be included in the design plan.

Any selected pretreatment component shall be approved by the Director for meeting the one-thousand (1,000) cfu/100 mL or two-hundred (200) cfu/100 mL fecal standard, as applicable.

Drip Distribution - Only pressure compensating emitters shall be used for STS drip distribution. The design plan shall specify the flow rate of the emitters and approximate absorption area per emitter. Timed dosing is required and the combined surge and reserve capacity shall be a minimum of one and a half times the daily design flow with increased surge capacity as needed to reduce the incidence of high water alarms during peak flows. Dosing controls shall prevent flow to the drip distribution component in excess of the daily design flow. Controls shall provide a means to record alarm events, troubleshoot system malfunctions, and monitor flow over time and flow rates during both dosing and flushing events including the use of a flow meter to monitor system operation.

The drip tubing shall be maintained through an automated scouring flush at a frequency adequate to prevent coating of the drip tubing and clogging of emitters. The frequency shall be specified in the design plan and shall not be less than twice a month per zone under normal operating conditions and shall be adjustable for actual operating conditions. Drip tubing flushes and filters flushes used to reduce solids going to emitters shall be returned to the influent end of the pretreatment component or septic tank. In the case where flush volumes may disrupt the process of a pretreatment component, added pretreatment component capacity shall be required.

For management purposes, at least two zones shall be included in the drip distribution design with an easily accessible shutoff mechanism for each zone. The timed micro-doses may be applied simultaneously or alternately to each zone. Air release valves are required at the highest elevation in each zone to vent the zone and prevent soil fines from entering the emitters during drain down after the pump shuts off.

INSTALLATION AND O&M:

Areas designated for installation and replacement shall be undisturbed and be protected from damage or disturbance. If any disturbance or damage has occurred, installation shall not proceed and the registered installer shall contact the owner, the drip distribution responsible party, and the board of health. Preparation of the soil infiltration interface for elevated sand fill drip fields shall not proceed when there is a risk of smearing or compaction.

Following installation and before STS approval by the board of health, the responsible party and/or the registered installer shall conduct a start-up procedure and document baseline measurements needed for future O&M and monitoring. Baseline measurements and monitoring information shall include but is not limited to dose rates and flushing flow rates for each zone and calculation of daily flow averages. As-built records including baseline measurements and O&M instructions shall be provided to the owner, service provider, and the board of health.

In conjunction with O&M management requirements and as a condition of an installation and operation permit for a drip distribution STS, the board of health **shall** require the owner of a drip distribution STS to maintain an O&M service contract. The O&M and monitoring of the entire STS shall be conducted at least annuallyor more often as required by the responsible party or the manufacturer of any component of the drip distribution STS, and shall be conducted by the responsible party or by a service provider who has been qualified by the responsible party.

REFERENCES / RESOURCES:

Tyler Table Resources – The Tyler Table is provided in the following published documents available through the Small Scale Waste Management Project (SSWMP) at University of Wisconsin, Madison. The papers provide a detailed explanation of the development and use of this loading rate table in Ohio.

Hydraulic Wastewater Loading Rates to Soil E. J. Tyler. 2001. Proceedings of the 9th International Symposium on Individual and Small Community Sewage Systems. ASAE. Saint Joseph, MI. P.80-86.
http://www.soils.wisc.edu/sswmp/SSWMP_4.43.pdf

Designing with Soil: Development and Use of a Wastewater Hydraulic Linear and Infiltration Loading rate Table E. Jerry Tyler and Laura Kramer Kuns. 2000. Conference Proceedings. NOWRA. Grand Rapids, MI.
http://www.soils.wisc.edu/sswmp/SSWMP_4.42.pdf

Drip Distribution Resources - These resources demonstrate the value of time dosed distribution with low volume per unit area application rates (instantaneous loading). Drip distribution is currently the best available technology for providing controlled instantaneous loading. This special device approval provides the assurances that drip distribution technology is provided and managed as a fully supported STS.

USEPA Onsite Wastewater Treatment System Manual (February 2002)
http://www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf
Pages 4-4 to 4-7 provide basic principles on dispersal of wastewater to the soil emphasizing low hydraulic loading, retention in the soil, timed dosing with peak flow storage, and uniform application of wastewater over the infiltrative surface. Page 4-6 states "… studies have shown that the applied effluent quality, hydraulic loading

rates, and wastewater distribution methods can affect the unsaturated soil depth necessary to achieve acceptable wastewater pollutant removals." This supports the concept of soil depth credits. Page 4-7 expands on the benefit of reduced instantaneous hydraulic loading rates to reduce the necessary separation distance. Pages 4-27 to 4-31 provide an overview of drip distribution.

Wastewater Subsurface Drip Distribution: Peer Reviewed Guidelines for Design, Operation, and Maintenance EPRI, Palo Alto, CA and Tennessee Valley Authority, Chattanooga, TN: 2004.
http://onsite.tennessee.edu/Drip_Guidelines.htm

Subsurface Drip Dispersal Module Text Bruce Lesikar, PhD Texas A and M University, and James Converse, PhD University of Wisconsin; University Curriculum Development for Decentralized Wastewater Management. National Decentralized Water Resources Capacity Development Project. University of Arkansas, Fayetteville, AR. September 2004
http://www.onsiteconsortium.org/files/Drip_Dispersal_Text.pdf

Soil Treatment Performance and Cold Weather Operations of Drip Distribution Systems R.M. Bohrer & J.C. Converse (2001)
http://www.soils.wisc.edu/sswmp/SSWMP_10.24.pdf

Recommended Guidance for the Design of Wastewater Drip Dispersal Systems Approved and adopted by the NOWRA Board of Directors – March 23, 2006
http://www.nowra.org/documents/DRIPGuidance-editedadopted.pdf