DRIP DISPERSAL OF SEPTIC TANK EFFLUENT Getting the most out of your soil absorption system area

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The opinions expressed herein are not necessarily those of the Massachusetts Department of Environmental Protection, the United States Environmental Protection Agency or the Barnstable County Department of Health and the Environment. Neither does the mention of any product or procedure constitute an endorsement of such by those agencies.



Two Types of Drip Application

Geoflow® Drip

FOLLOWING SECONDARY TREATMENT



J & R Sales and Service 44 Commercial Street Raynham, MA 02767 Oakson, Inc. 6 Sargent Street Gloucester, MA 01930

FOLLOWING SEPTIC TANK EFFLUENT

Perc-Rite[®] Drip



Types of Drip Application

Geoflow® Drip

FOLLOWING SECONDARY TREATMENT Treatment in this case is the BioMicrobics Inc. BioBarrier®





Photo 1: Aerial view of Noquochoke Village. Wastewater system location indicated by red arrow.

CASE STUDY

Noquochoke Village Affordable Housing project with stringent effluent requirements for Total Nitrogen

Source:



What is "secondary" treatment ?



Biochemical

Oxygen Demand





There are many secondary-treatment units available. To use any particular unit in conjunction with a drip dispersal product, you should check with the manufacturer of the drip dispersal proposed. Not all secondary treatment units are alike !

https://www.mass.gov/guides/approved-title-5innovativealternative-technologies#-overview-

General Use - Secondary Treatment Units

Standard Conditions for Secondary Treatment Units for General Use

 Standard Conditions for Secondary Treatment Units Certified for General Use These conditions apply only to the approvals listed below. Please be advised that if designed in accordance with these conditions, MassDEP approval is no longer required. Revised March 20, 2015.

Types of Drip Application

Focus Here

Distributing primary treated effluent (septic tank effluent) directly on the soil treatment area.....studies at MASSTC

Perc-Rite[®] Drip FOLLOWING SEPTIC TANK EFFLUENT







Massachusetts Alternative Septic System Test Center









VISION

To eliminate the environmental health hazards and negative environmental impacts of onsite wastewater treatment.

The Massachusetts Alternative Septic System Technology Center

MISSION

 To provide a test bed for the public and private sectors to develop and test innovative septic system technologies.
 To investigate the real-world impacts of septic system use.
 To educate the public on the proper use and

maintenance of septic systems.

VALUES

Integrity Do the right thing, even when no one is watching.

Innovation There's a way to do it better - find it.

Teamwork None of us is as smart as all of us.

Accuracy Details make the difference.

Knowledge Have it and share it. "If it works, we'll tell the world... if it doesn't work, we'll tell the world !"

Third party evaluation of wastewater related products Early in 2021, Oakson, Inc. commissioned MASSTC to perform thirdparty testing of the Perc-Rite[®] drip dispersal system using septic tank effluent using 24 inches of two soil types beneath the dispersal area.

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* REMEMEBER THAT PERC-RITE® AND GEOFLOW® ARE APPROVED FOR DISPOSAL FOLLOWING SECONDARY TREATMENT, BUT OF THE TWO DRIP DISPERSAL SYSTEMS ONLY PERC-RITE® IS APPROVED FOR SEPTIC TANK EFFLUENT

Perc-Rite® Drip Dispersal



- Side by side cells
- Sand and Loamy Sand (2 ft deep)
- Title 5 application rates
- Regular sampling
- Comparisons with other treatment strategies where possible
- Lined cells to collect all percolate



The study done presented an unprecedented opportunity to compare selected advanced treatment modes with the drip dispersal of septic tank effluent in conjunction with 24 inches of soil media.

Perc-Rite® DRIP DISPERSAL

(and standard pipe-in-stone trench following septic tank)

ADVANCED ONSITE TREATMENT TECHNOLOGIES

Advanced Treatment Units Compared

- Recirculating media filter
- Sequencing batch reactor
- Activated sludge treatment



Fecal Coliform



Fecal coliform are the generally-accepted indicators of public health risk. In raw domestic wastewater, the densities are in the millions per 100 ml of sample. The vertical setbacks to groundwater from the bottom of the dispersal area across the country are generally-believed to be based on the densities of these organisms at some vertical depth. Some fecal coliform, like Escherichia coli, are enteric in origin while others may not be. As such, they are a conservative estimate of human enteric <u>bacterial</u> pathogens.



Conclusion:

With few exceptions, fecal coliform densities in percolate beneath the Perc-Rite® Drip Dispersal System were below 100 colonies/100 ml, compared with an excess of this density in nearly all occurrences beneath treatment unit dispersal trenches at the 24" vertical depth as well as at that depth beneath standard septic tank effluent disposal. (41 samples)

NITROGEN

What can we can we say about nitrogen ?









Conclusion:

Without consideration of the impacts of evapotranspiration, the Perc-Rite® drip dispersal with 24 inches of sand or loamy sand removed 50% of the influent nitrogen for the period tested (48 samples each soil type).

Phosphorus The gift that keeps on giving

What can we say about phosphorus from onsite septic systems?

- No gaseous phase to return to atmosphere like nitrogen
- Continuously recycles once in the environment unless sequestered
- Many natural sources
- No General Use Approvals in the Commonwealth for its removal



* Technologies compared did not purport to remove phosphorus



Summary of Recent Work

- The Perc-Rite[®] drip system in conjunction with two feet (24 inches) of sand or loamy sand reduces fecal coliform entrainment beneath the soil treatment area to <100 fecal coliform/100 ml(~ 4-5 log₁₀) reduction.
- Total nitrogen (TN) reduction with the Perc-Rite[®] drip system in conjunction with two feet (24 inches) of sand or loamy sand exhibited a median 50% reduction of the influent during the study period.
- The Perc-Rite[®] drip system in conjunction with two feet (24 inches) of loamy sand reduced total phosphorus to levels to < 1 mg/L over the study period.

What we knew from previous work

Investigation of the Treatment of Drip Dispersal Onsite Septic Systems for the Removal of Selected Micro-Constituents and Contaminants of Emerging

> Concern Project Number 01-05/319

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Figure 2. a.) Cell liner installed with sloped sides (toward center drain) and washed peastone around distally-sloped center drain; b.) drip tubing placed within each cell, 16 inches on center, and outer tubing lengths six inches from liner sides; c.) drip tubing with two inches of sand cover before loam cover; d.) two inches of loam spread and raked into sand cover to provide sand-loam transition; e.) finished cells with sod in place; f.) tipper tray inside riser receiving bottom drain pipe—note magnetic-switch operated data logger for recording approximate volume by number of tips.



Hoping to encourage a complex and diverse biological community to treat CEC.

Diverse Biological Community Plant uptake and phytoremediation

Drip Emitters

Drip Emitters

Complex rhizoshpere interactions

Adsorption Transformation Complexation Removal of selected contaminants of emerging concern by drip dispersal



Removal of selected contaminants of emerging concern by drip dispersal



Likely factors that enhance CEC removal in wastewater treatment.

Organism diversity
Aerobic status of treatment environment
Residence time in treatment unit
Alternation of aerobic-anaerobic conditions



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www.epa.gov/research

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Office of Research and

Ecosystems Research Grants

Vegetable bed irrigated with septic tank effluent via Perc-Rite drip.

Vegetable bed irrigated with tap water.

In the end, there is no wastewater there's only water

Questions?

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