June 24, 2025

Drip Dispersal

Innovative Wastewater Disposal in the Region for over 25 years

Presented by:
Rob Sarmanian

yowa
Yankee Onsite Wastewater Association

OAKSON

Today's Session

- Types of Drip Systems in New England
- Drip Dispersal Concept
- Unique Applications
- Drip Dispersal at MASSTC

Special Thanks…Lauren Usilton and George Heufelder for contributions

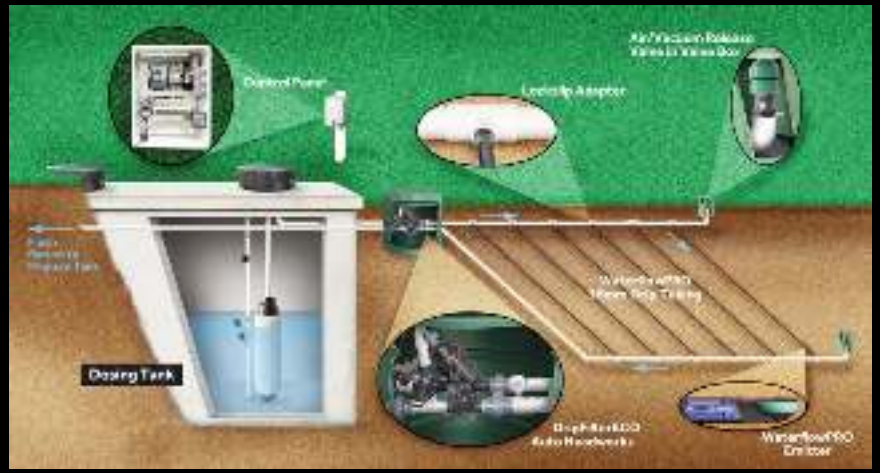
GEOFLOW
SUBSURFACE DRIP

J&R Sales
and Service, Inc.

Two Regional Drip Systems

OAKSON

AMERICAN
Manufacturing Company, Inc.
Perc-Rite® Drip Dispersal



GEOFLOW
SUBSURFACE DRIP

J&R Sales
and Service, Inc.

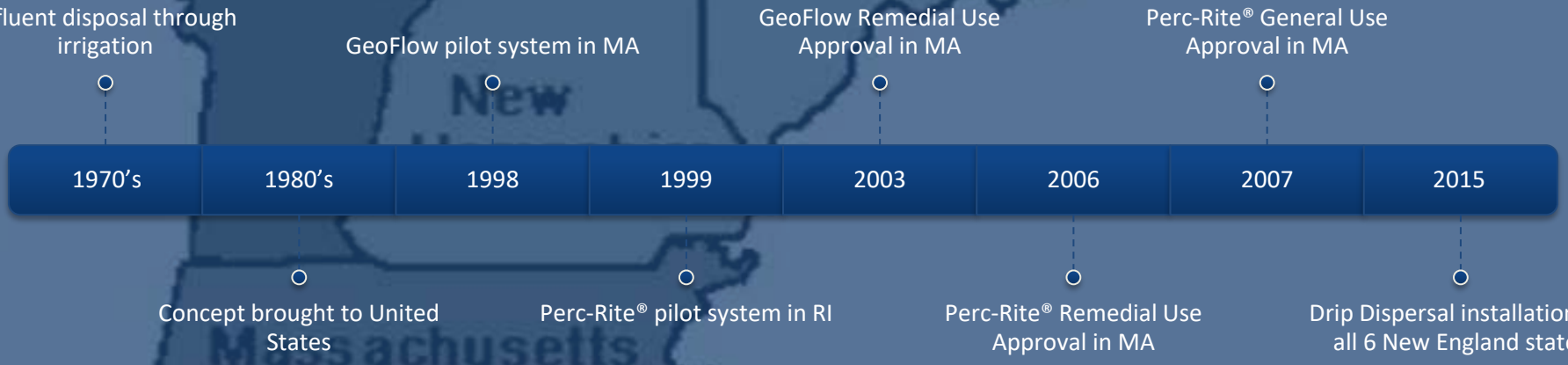
- Follows Secondary Treatment Systems meeting effluent quality of 30/30 mg/L BOD/TSS

- Approved for Primary Effluent or Secondary Treatment disposal in all New England States

AMERICAN Manufacturing Company, Inc
Perc-Rite® Drip Dispersal

OAKSON

Brief History of Drip Dispersal



Drip Dispersal Advantages

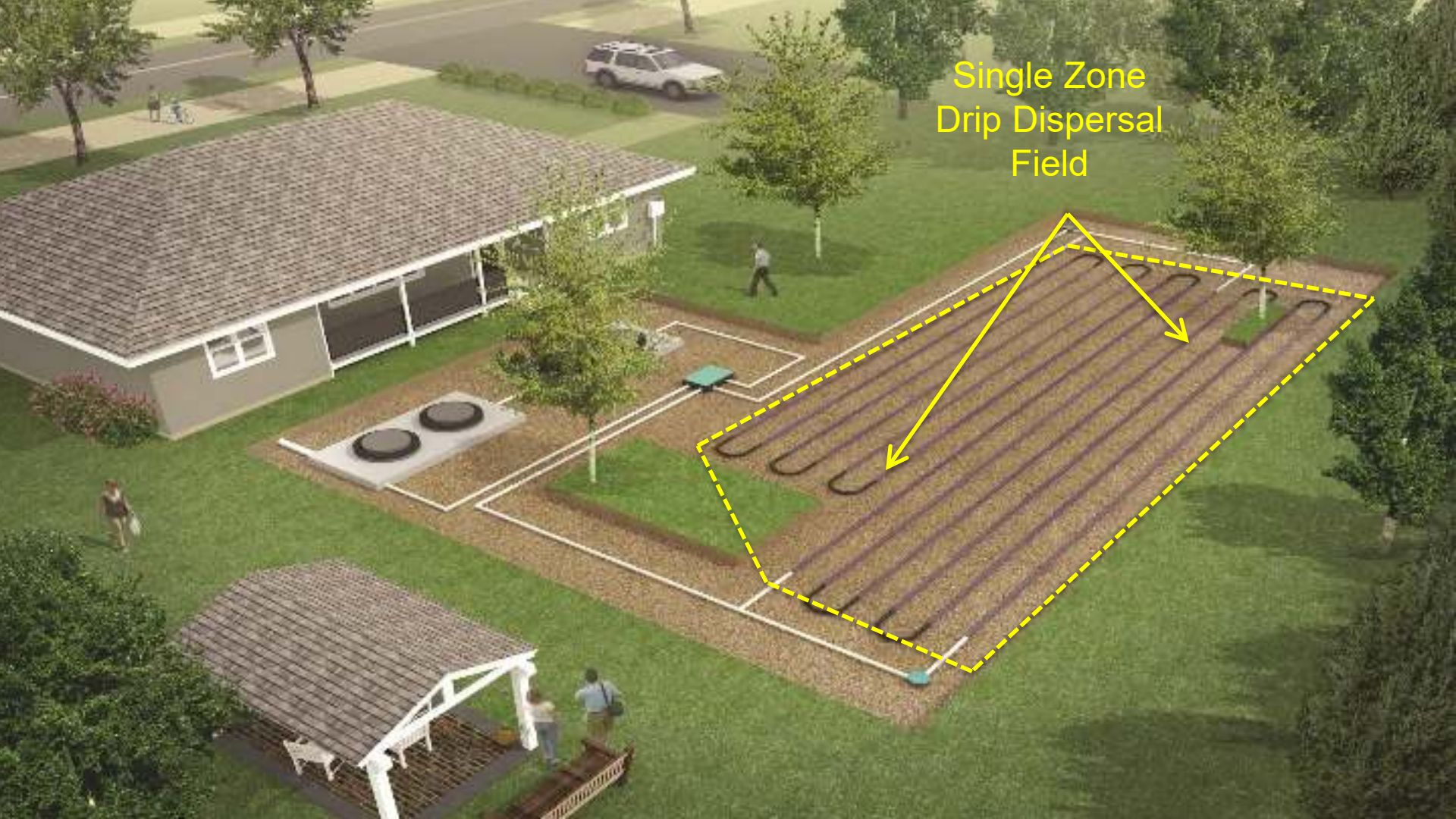
- Preserve trees, lawn and landscape
- Slope follows contour of land
- Finished height as low as 6” above drip tubing
- Septic tank effluent or treated effluent: all size and offset advantages of treatment systems can be used. See approvals
- Equivalent to pressure distribution
- Time dosing
- Flexible reserve area requirements

Drip Dispersal Concept


Pump Chamber
Filtration
Septic Tank
or STU


Run- Single Drip line


Lateral – Series of Runs


Single Zone
Drip Dispersal
Field

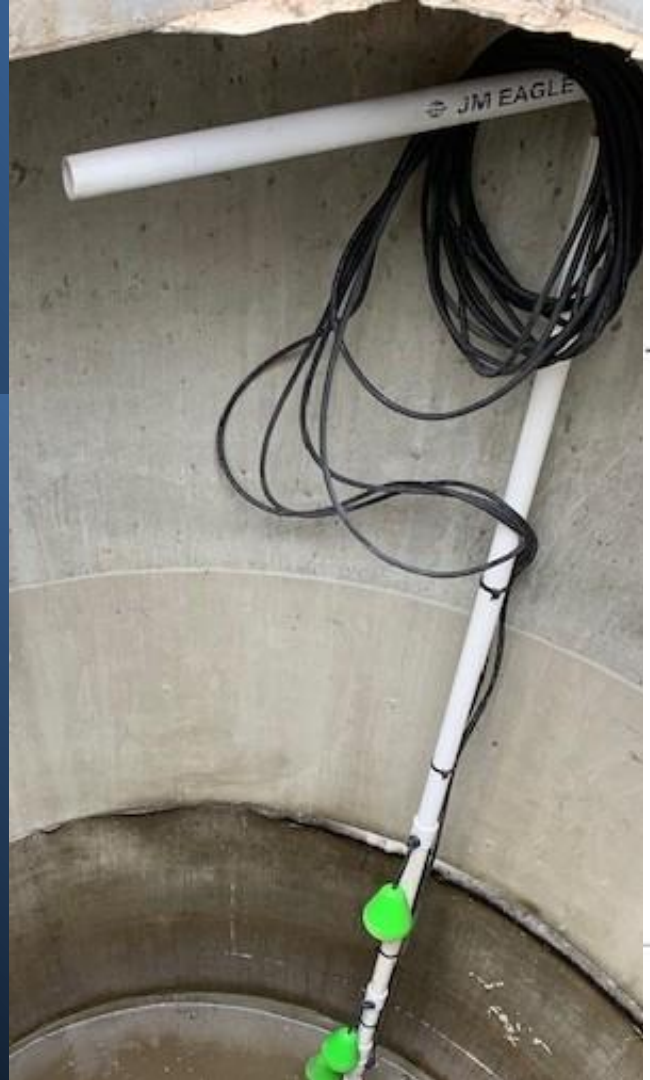

Control Panel
Pump Supply line
Air Release Valve
Filtration
Return Line and Manifold
Gravity Return Line
Supply Line and Manifold
Air Release Valve

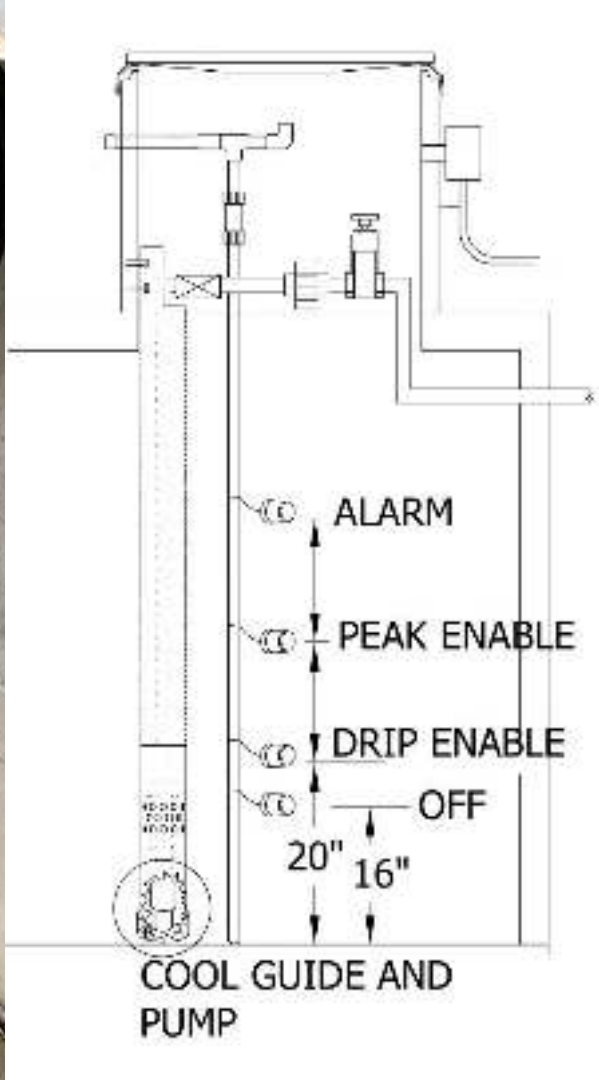

Drip Dispersal System

Drip Dispersal System Components

Effluent Pump

4 Float Timer-Based System



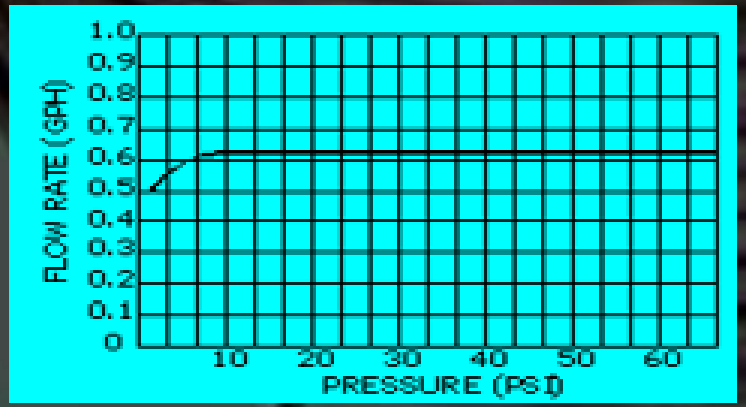


Filtration




Control Panel

Drip Dispersal Tubing



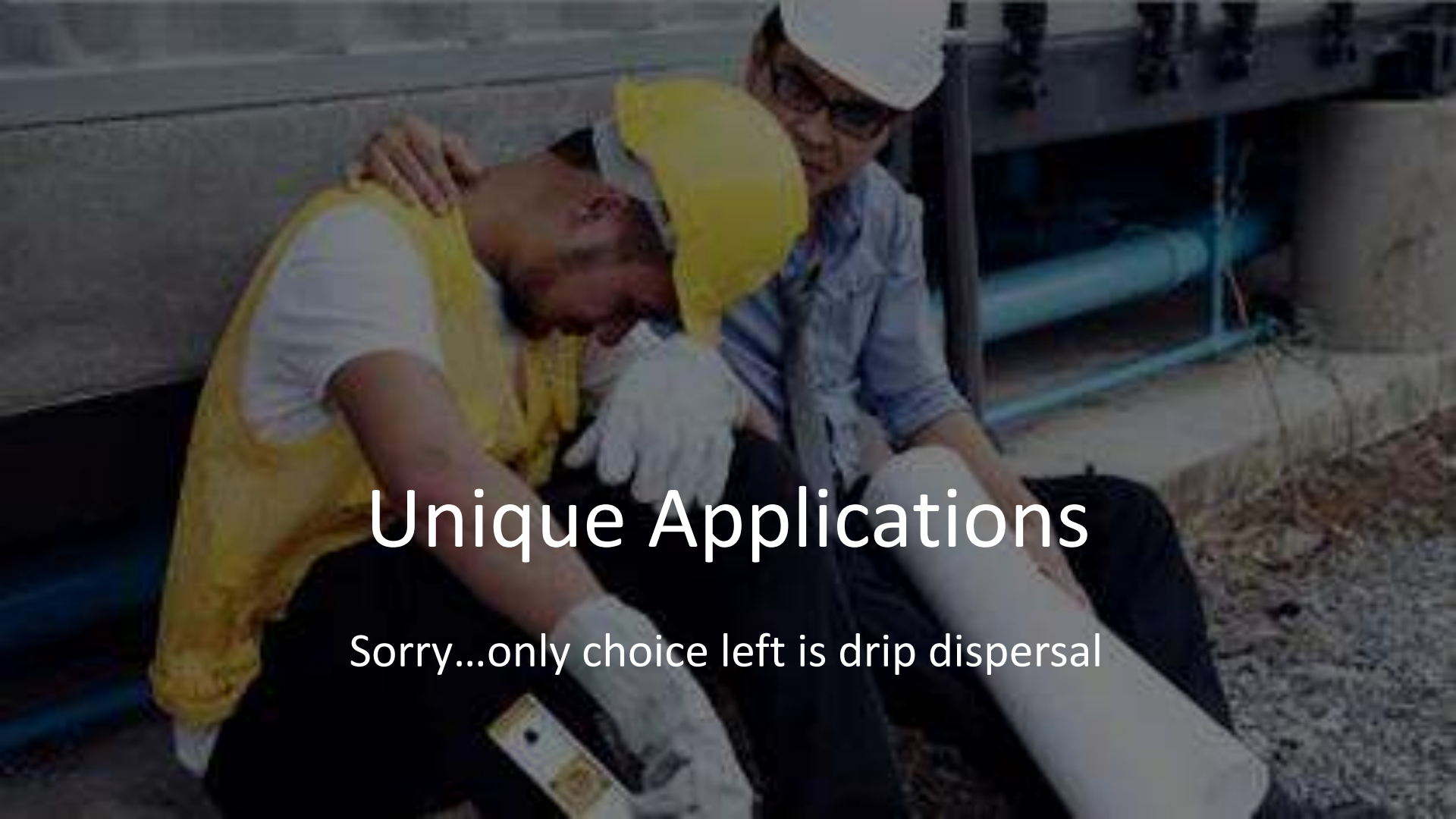
Manifolds:
to Supply Drip Tubing Evenly

Drip Dispersal Design

All 6 New England States have design criteria in state regulations (small flows)

Large flow projects (GDP) are prevalent in region

See your local state rules or drip dispersal vendor



Unique Applications

Sorry…only choice left is drip dispersal

Working around site features

Challenging Sites

Preserving Wooded Sites

Flexible Layout Options

-

Plowed and Trenched Installations


Ditch
Witch


Ditch Witch
BLACKSTONE VALLEY
IRRIGATION
508-455-8104


DRIP TUBING INSTALLATION VIDEO

LARGE FLOW PROJECTS: SUBDIVISIONS, COMMERCIAL, MUNICIPAL
30,000 GPD TO 320,000 GPD

Current and Future Large Flow Examples

Current:

- Bennington, NH – 48,000 gpd (2009)
- Westford, MA – 43,500 gpd (2011)
- Portsmouth, RI – 67,000 gpd (2015)
- Bridgton, ME – 116,500 gpd (2023)
- Old Saybrook, CT – 30,000 gpd (April 2025)
- Casco, ME – 40,000 gpd (May 2025)

Future:

- Windham, ME – 320,000 gpd (January 2026)
- Montgomery, VT – 30,000 gpd (May 2026)
- Wolcott, VT – 30,000 gpd (September 2026)

MASSTC

Massachusetts Alternative Septic System Test Center

EPA

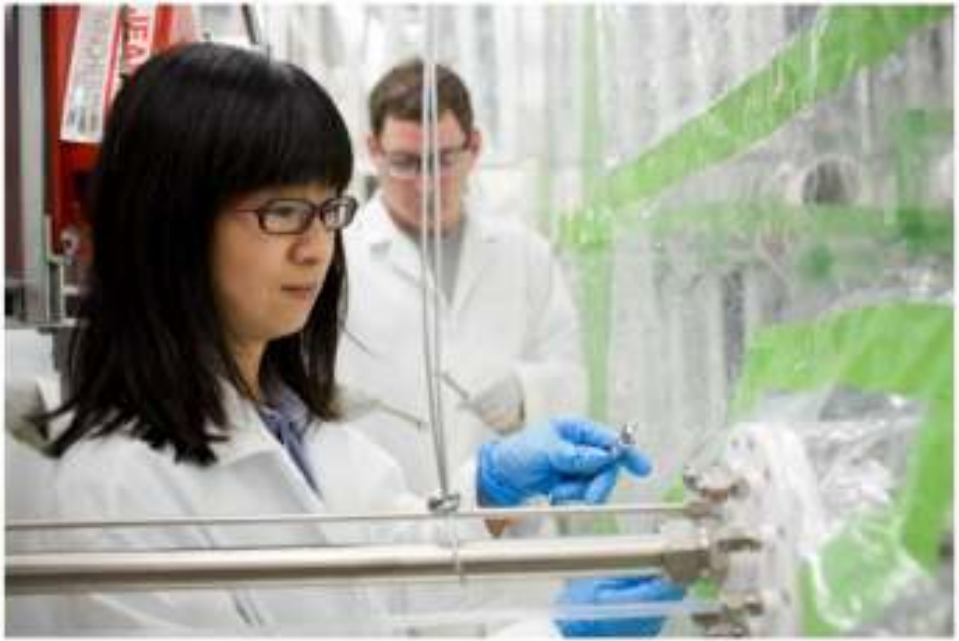
www.epa.gov/research

science in ACTION

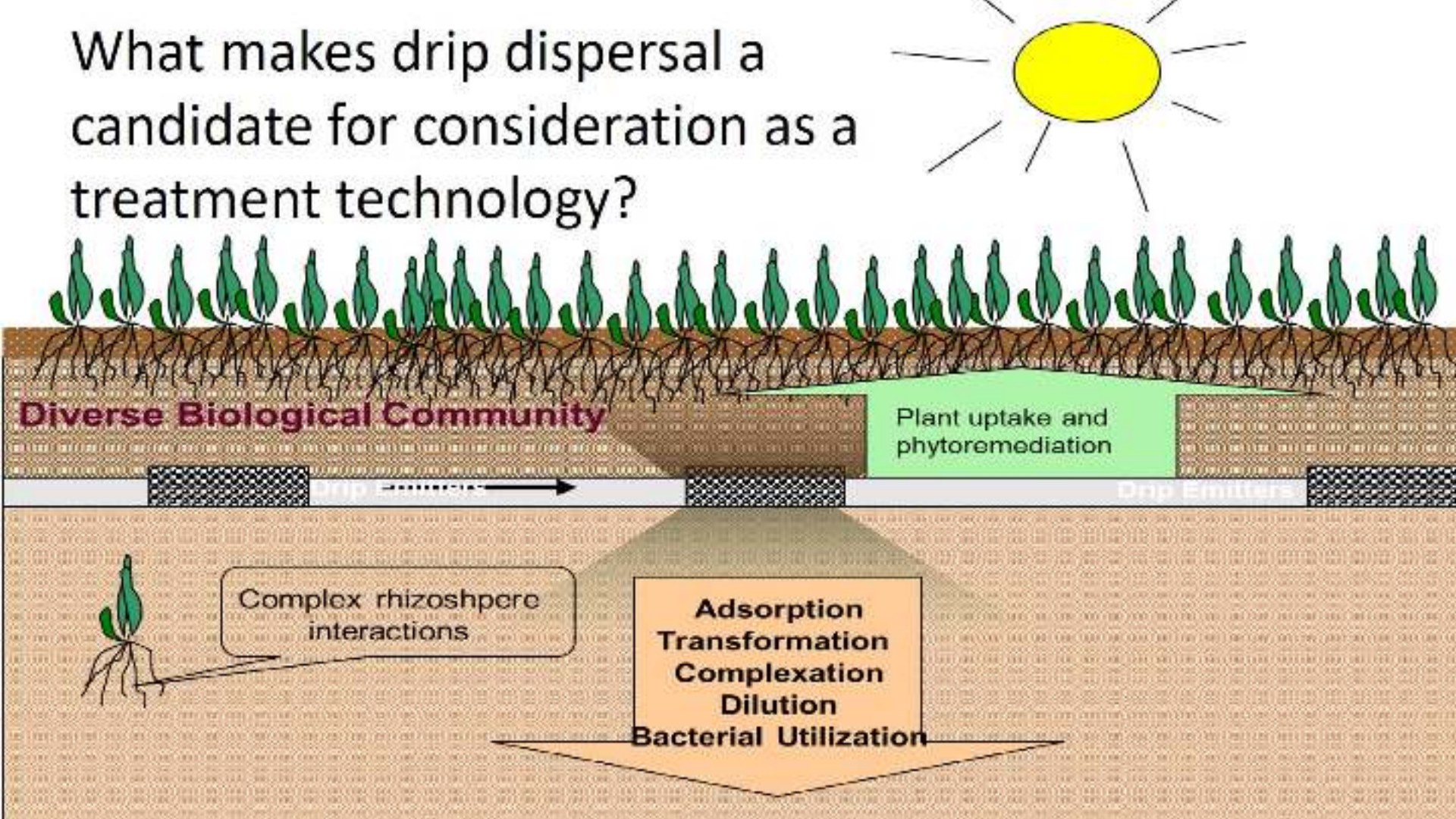
INNOVATIVE RESEARCH FOR A SUSTAINABLE FUTURE

SCIENCE TO ACHIEVE RESULTS (STAR) RESEARCH GRANTS PROGRAM

The U.S. Environmental Protection Agency's (EPA) Science to Achieve Results (STAR) Program aims to stimulate and support scientific and engineering research that advances EPA's mission to protect human health and the environment. It is a competitive, peer-reviewed, extramural research program that provides access to the nation's best scientists and engineers in academic and other nonprofit research institutions. The STAR program funds research on the environmental and public health effects of air quality, environmental



What makes drip dispersal a candidate for consideration as a treatment technology?



Barrel study (2019):

Various soil types and collection depths

Mechanically did not work consistently…


11/27/2023

Perc-Rite®
DRIP DISPERSAL

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

Septic tank effluent

Perc-Rite drip dispersal

24" sand

Sample collection point

comparison

ADVANCED ONSITE TREATMENT TECHNOLOGIES

Advanced Treatment Units Compared

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

Standard pipe-in stone trench dispersal

Sample collection point

24" sand

Sample collection point

comparison

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.

CERTIFICATE OF ANALYSIS

Barnstable County Health Laboratory (M-MA009)

Recipient:
Oakson
6 Sargent St.
Gloucester, MA 01930

Order No.: G2223411S
Report Dated: 09/07/2022
Submitter: Oakson
Description: Rick Sand & Loam TF, BOD

Laboratory ID#: 22234115-01

Sample #:
Collection Address: Oakson Rick Sand
Sample Location:

Matrix: Water - Waste Water
Sampled: 08/18/2022 7:45 By: BH
Received: 08/18/2022 10:25 By:
Turn Around: Standard

Test Parameters

ITEM	RESULT	UNITS	RL	MCL	METHOD #	ANALYST	TESTED	TIME
BOD (5 DAY) TEST	ND	mg/L	2.0		SM 5210 B	CL	08/19/2022	
Phosphorus - Total	1.3	mg/L	0.093		SM 4500 P	CL	08/29/2022	

Laboratory ID#: 22234115-02

Sample #:
Collection Address: Oakson Field Loam
Sample Location:

Matrix: Water - Waste Water
Sampled: 08/18/2022 7:45 By: BH
Received: 08/18/2022 10:25 By:
Turn Around: Standard

Test Parameters

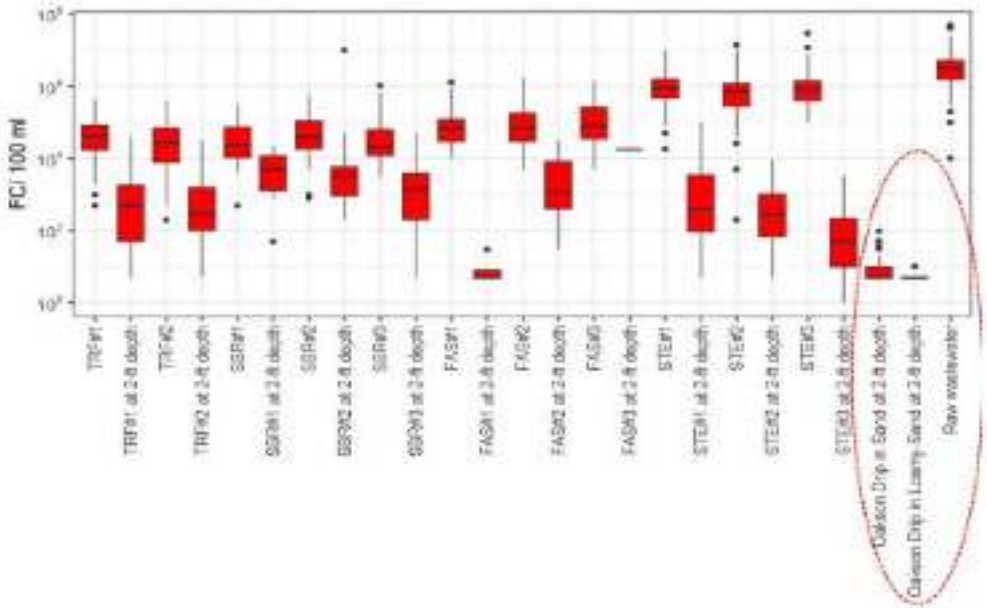
ITEM	RESULT	UNITS	RL	MCL	METHOD #	ANALYST	TESTED	TIME
BOD (5 DAY) TEST	ND	mg/L	2.0		SM 5210 B	CL	08/19/2022	
Phosphorus - Total	ND	mg/L	0.010		SM 4500 P	CL	08/29/2022	

Attached please find the laboratory certified chromatograms.

Approved By: 09/7/22
Lab Manager

4.1 Fecal indicator bacteria (or fecal coliform) removal

Fecal coliform is commonly used as an indicator of public health safety. It is generally accepted that fecal coliform densities correspond to the concurrent presence of human pathogens and that the present vertical separation requirement between the point of wastewater dispersal and groundwater required in 310 CMR 15.212 is partially based on this metric. The Perc-Rite® Drip Dispersal System exhibited the lowest density of fecal coliform compared with all technologies sampled at either the exit point of the treatment device or below the two-foot sand layer beneath the soil absorption system receiving the effluent (Figure 2).



Oakson Field Loam

Date	Fecal coliform (MPN/100 mL) [illegible]	Fecal coliform (MPN/100 mL) [illegible]	BOD5 (mg/L)	SO4 (mg/L)	Alkalinity (mg/L CaCO3)	NH4 (mg/L)	NO3 (mg/L)	TP (mg/L)	TKN (mg/L)	TN (mg/L)	TSS (mg/L)	pH	Temperature (°C)	DO (mg/L)
5/20/2021	<10		ND	40	320	ND	0.51	0.056	1.2	43.31	ND	7.06	14.6	9.09
6/4/2021	<10		ND	33	320	ND	0.37	0.056	1.1	34.47	ND	7.04	15.4	8.45
6/17/2021	<10			12	330	ND	0.45	0.047	1.4	15.75		6.99	17.8	8.18
7/8/2021	10			7.5	310	ND	0.27	0.078	0.82	8.59		6.91	16.7	7.59
7/22/2021	<10			6.6	310	ND	0.13	0.07	1.2	10.13		6.63	21.5	7.2
8/12/2021	<10			5.6	340	ND	1.6	0.057	1.1	12.3		6.8	21.6	6.56
8/26/2021	<10			24	330	ND	ND	0.046	1.1	25.305		6.53	22.6	7.51
9/9/2021	<10			7.1	300	ND	0.54	0.078	1.1	7.94		7.1	21.4	7.52
9/23/2021	<10			33	310	ND	0.63	0.020	1.1	15.73		7.01	21.3	7.71
10/6/2021	<10			0.55	290	ND	0.6	0.08	1.1	2.25		6.52	17.1	8.53
10/21/2021	10		ND	26	240	ND	0.82	0.052	1.1	28.41		6.16	16.5	9.09
11/10/2021	<10		ND	24	310	ND	0.59	0.077	0.78	25.37		6.79	14.3	9.13
11/18/2021	<10		ND	25	310	ND	0.43	0.023	0.79	26.2		7.05	13.3	9.29
11/30/2021	10		ND	21	240	ND	0.47	0.051	0.8	22.27		7.03	10.4	9.57
12/15/2021	<10		ND	25	290	ND	0.23	ND	0.84	27.06		6.59	9.9	9.11
12/30/2021	<10		ND	22	290	ND	0.057	0.06	0.72	22.842		[illegible]	8.1	9.61
1/11/2022	<10		ND	33	310	ND	0.037	0.056	0.79	33.877		6.67	7.1	9.64
1/26/2022	<10		ND	25	210	ND	0.078	0.052	0.74	25.818		7.2	5	11.4
2/9/2022	<10		ND	31	300	ND	0.33	0.06	0.80	32		6.59	4.7	11.5
2/24/2022	<10		ND	46	200	ND	0.085	0.033	0.7	46.885		6.94	5.6	11.7
3/8/2022	<10		ND	24	220	ND	0.05	0.030	0.57	24.62		7.05	5	11.6
3/22/2022	<10		ND	22	260	ND	0.051	0.033	0.84	22.891		6.65	6.5	10.5
3/28/2022		5.1		15	330	ND	ND		0.85	15.855		7.16	7.7	10.1
4/5/2022	<10		ND	24	300	ND	[illegible]	[illegible]	[illegible]	24.861		6.91	8.5	10.4
4/19/2022	<10		ND	21	290	[illegible]	[illegible]	[illegible]	[illegible]	21.76		6.93	12.5	9.81
4/26/2022		1		24	290	ND	0.33	[illegible]	0.26	24.57		6.82	10.7	10.3
5/3/2022	<10		ND	33	340	ND	0.085	0.020	0.5	33.585		6.41	10.9	9.56
5/17/2022	<10		ND	14	340	ND	0.057	0.044	0.95	20.017		7.14	14.5	9.17
5/31/2022		1		18	330	ND	ND		0.89	18.815		6.7	15	8.54
6/7/2022	<10		ND	15	330	ND	0.029	0.032	0.66	15.219		6.35	15.6	8.54
6/22/2022	10		ND	14	330	ND	0.14	0.02	1	15.16		6.94	17.5	8.01
6/28/2022		<1		14	300	ND	0.16		0.95	15.11		6.44	16.7	7.42
7/7/2022	<10		ND	12	310	ND	0.11	0.034	0.86	12.99		6.46	18.6	7.36
7/12/2022	<10											6.67	13.4	7.21
7/20/2022	<10		ND	12	340	ND	ND	0.047	0.95	12.955		6.56	20.6	5.42
7/26/2022		5.2		8.8	300	ND	ND		0.95	9.775		6.43	22	5.91
7/27/2022	<10											6.67	21.3	5.97
8/2/2022	<10		ND	17	310	ND	0.33	0.01	1.1	18.30		6.06	21.4	5.2

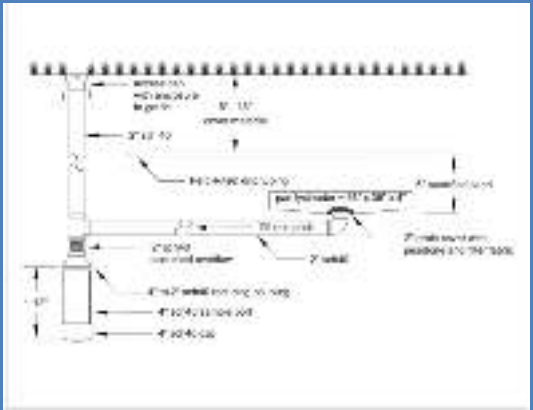
Oakson Field Sand

Date	Fecal coliform (MPN/100 mL) [illegible]	Fecal coliform (MPN/100 mL) [illegible]	[illegible] (mg/L)	SO4 (mg/L)	Alkalinity (mg/L CaCO3)	NH4 (mg/L)	NO3 (mg/L)	TP (mg/L)	TKN (mg/L)	TN (mg/L)	TSS (mg/L)	pH	Temperature (°C)	DO (mg/L)
5/20/2021	<10		ND	52	52	ND	0.55	0.041	0.57	58.55	2.4	6.64	16.6	8.29
6/4/2021	<10		ND	14	110	ND	0.44	0.044	0.66	15.16	2.6	6.65	15.4	9.75
6/17/2021	30			25	39	ND	0.5	1.13	0.80	26.30		6.97	17.8	6.90
7/8/2021	<10			13	35	ND	0.48	1.61	0.76	14.22		6.61	15.7	6.61
7/22/2021	<10			10	23	ND	ND	0.3	0.85	10.855		6.76	21.7	6.06
8/12/2021	<10			10	45	ND	0.47	1.5	1	11.47		6.66	21.9	7.06
8/26/2021	<10			24	45	ND	ND	1.1	0.78	24.781		6.75	22.9	7.46
9/9/2021	20			3.4	22	ND	0.54	1.7	1	10.94		6.62	21.3	6.14
9/23/2021	10			24	23	ND	0.65	1.4	1.1	25.75		6.86	21	6.26
10/6/2021	41			5.4	28	ND	0.64	5.2	1.4	7.44		6.58	19.1	8.52
10/21/2021	30		ND	41	46	ND	1	2.2	1.1	43.1		6.28	16.1	9.3
11/10/2021	10		ND	27	53	ND	0.58	1.3	0.77	28.35		6.26	14.1	9.86
11/18/2021	10		ND	23	53	ND	0.42	2.4	0.98	24.4		6.76	15	10
11/30/2021	<10		ND	20	54	ND	0.44	2.5	0.97	21.41		6.45	10.5	10.5
12/16/2021	<10		ND	22	58	ND	0.12	2.2	1.2	24.42		6.63	9.2	11
12/30/2021	<10		ND	13	59	ND	0.078	2.3	1.3	14.378		6.33	8.3	11.3
1/11/2022	20		ND	21	54	ND	0.072	2.3	0.95	22.022		6.54	6.8	11.5
1/26/2022	41		ND	23	43	0.56	0.17	2.3	1.4	24.57		6.56	4.8	11.9
2/9/2022	[illegible]		4.4	10	46	0.53	0.24	4.51	1.5	12.06		6.11	3.1	11.2
2/24/2022	11		4.3	23	41	ND	0.085	2.75	1.2	24.245		5.94	5.6	11.6
3/8/2022	10		ND	24	37	ND	0.051	2.06	0.78	24.831		6.14	5.2	12
3/22/2022	52		ND	28	45	ND	ND	3.06	1.3	[illegible]		6.05	5	11.1
3/28/2022		22.9		14	57	ND	0.051		1.4	15.451		6.47	7.1	10.6
4/5/2022	<10		ND	15	54	ND	0.065	1.94	1.2	16.265		6.11	8.5	11.1
4/19/2022	20		ND	8.6	56	ND	ND	1.96	1	9.625		6.21	10.2	10.2
4/26/2022		7.4		7.6	55	ND	0.054		1.5	9.254		6.48	10.4	10.4
5/3/2022	<10		2.3	9.2	55	ND	0.058	0.357	0.94	10.198		[illegible]	[illegible]	10.6
5/17/2022	<10		ND	4.4	54	ND	ND	1.64	1	[illegible]		[illegible]	[illegible]	9.81
5/31/2022		1		17	21	ND	0.11		0.88	17.99		[illegible]	[illegible]	9.23
6/7/2022	<10		ND	14	24	ND	0.09	1.66	0.38	14.77		[illegible]	15.7	9.23
6/28/2022	<10		ND	14	55	ND	0.21	1.5	1.1	15.31		6.55	17.5	8.02
6/28/2022		3.6		13	58	ND	0.11		1	14.11		6.06	19.4	8.56
7/7/2022	<10		ND	24	51	ND	0.21	1.3	0.91	25.12		6.56	18.9	8.41
7/13/2022	<10											6.26	19.6	6.47
7/20/2022	<10		ND	21	43	ND	0.051	1.5	0.84	21.891		6.01	20.6	7.87
7/26/2022		4.1		30	44	ND	0.32		0.67	30.99		6.18	21.9	7.88
[illegible]	<10											6.18	21.6	7.74
8/9/2022	<10		ND	25	41	ND	0.15	1.3	0.61	25.76		5.87	21.6	7.74

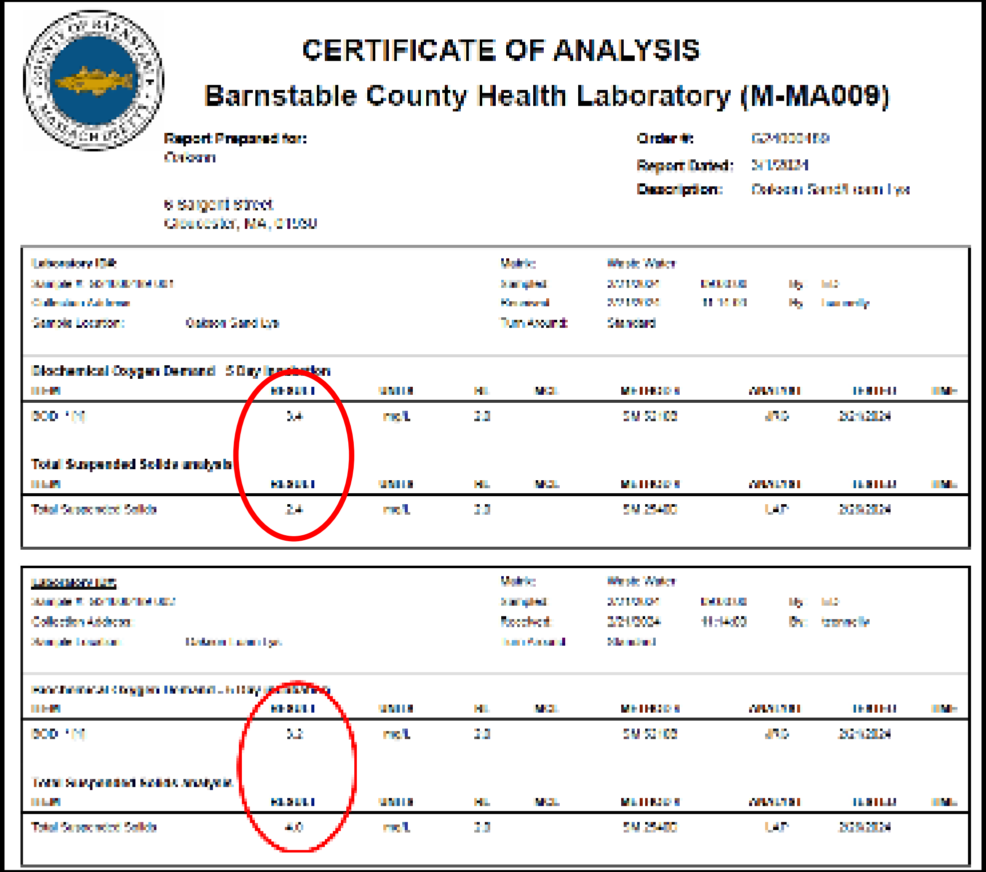
The results suggest that:

- Regarding fecal indicator bacteria, the Perc-Rite® Drip Dispersal System achieved the highest level of removal compared with other treatments.
- Nitrogen removal in the drip system exceeded 50%, without consideration of any concentrating effects of evapotranspiration.
- Phosphorus attenuation exceeded all other modes tested. The average total phosphorus in percolate beneath the sand test cell averaged 1.8 mg/L (± 0.3, *p=.05*, n=34), and beneath the loamy- sand test cell 0.68 mg/L (± 0.11, *p=.05*, n=34). This latter level compares favorably with technologies presently under evaluation through the Pilot Approval process in the Commonwealth which requires those technologies to achieve levels less than 1.0 mg/L total phosphorus.
- Other indicators of wastewater stabilization such as $BOD_{5\text{-}day}$ and ammonia levels were assayed and compare favorably with many advanced onsite treatment technologies.


MADE IMPROVEMENT
STILL NOT SATISFIED



Collection 6” below emitters



CERTIFICATE OF ANALYSIS

Barnstable County Health Laboratory (M-MA009)

Report Prepared for:

Order #:

Report Dated:

Description:

Gloucester, MA, 01930

Biochemical Oxygen Demand 5 Day Incubation

ITEM	RESULT	UNITS	RL	MCL	METHOD	ANALYST	TESTED	TIME
BOD	3.4	mg/L	2.0		SM 5210B	[illegible]	[illegible]	

Total Suspended Solids analysis

ITEM	RESULT	UNITS	RL	MCL	METHOD	ANALYST	TESTED	TIME
Total Suspended Solids	2.4	mg/L	2.0		SM 2540D	[illegible]	[illegible]	

Collection Address

Received

Biochemical Oxygen Demand 5 Day Incubation

ITEM	RESULT	UNITS	RL	MCL	METHOD	ANALYST	TESTED	TIME
BOD	3.2	mg/L	2.0		SM 5210B	[illegible]	[illegible]	

Total Suspended Solids analysis

ITEM	RESULT	UNITS	RL	MCL	METHOD	ANALYST	TESTED	TIME
Total Suspended Solids	4.0	mg/L	2.0		SM 2540D	[illegible]	[illegible]	

VERMONT

State of Vermont
Department of Environmental Conservation

Agency of Natural Resources
Drinking Water and Groundwater Protection Division

WASTEWATER SYSTEM AND POTABLE WATER SUPPLY
INNOVATIVE AND ALTERNATIVE (I/A) TECHNOLOGY
GENERAL USE APPROVAL

LAWS/REGULATIONS INVOLVED
10 V.S.A. Chapter 64, Potable Water Supply and Wastewater System Permit
Wastewater System and Potable Water Supply Rules, Effective November 6, 2023

Applicant and I/A Approval Recipient:
Oakson, Inc
6 Sargent Street
Gloucester, MA 01930

rob@oakson.com
978-282-1322 x801
www.oakson.com

Approval Number: 2025-01-R0
Date Issued: 02/21/2025
Date Expires: 05/01/2027

Soil Based Treatment and Disposal

Same hydraulic unit, pump, control panel, and drip tubing


IMPOSSIBLE TO SEE THE
FUTURE IS

Thank You

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