

Phosphate Removal System - PhosphoHammer™

SludgeHammer has developed a phosphate removal module that can easily be installed between any SludgeHammer treated septic tank and an existing leachfield that is capable of reducing dissolved phosphate by at least 90%.

The SludgeHammer module grew out of an initial experiment by Silver Lake resident Bill Bryker, working with local SludgeHammer dealer Dan Swihart. Kudo's to both gentlemen for proving the feasibility of phosphate removal as a retrofit in an existing system.

The following data shows how effective the removal is:

1. High phosphate in septic tank prior to treatment.

 <p><i>the science of compliance</i></p>	<p>phone 231-773-5998 toll free 800-733-5995 fax 231-773-6332</p>	<p><i>Trace Analytical Laboratories, Inc.</i> 2241 Black Creek Road Muskegon, MI 49844-0973 18450 Trace Labs Court www.trace-labs.com</p>
ANALYTICAL RESULTS		
Trace Project ID: T16I298		
Client Project ID: Phosphorus Analysis		
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Trace ID: T16I298-01	Date Collected: 09/17/16 13:00	Matrix: Wastewater
Sample ID: Sludge Hammer	Date Received: 09/19/16 08:35	
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PARAMETERS	RESULTS UNITS	RDL DILUTION PREPARED BY ANALYZED BY NOTES MCL
<hr/>		
METALS, TOTAL		
<i>Analysis Method: EPA 200.7 Rev 4.4</i>		
<i>Batch: T064124</i>		
Phosphorus	9.4 mg/L	0.050 1 09/21/16 rwa 09/21/16 dtm
<hr/>		
WET CHEMISTRY		
<i>Analysis Method: SM 4500-P-E-11</i>		
<i>Batch: T064104</i>		
Orthophosphate as P	9.2 mg/L	0.80 100 09/19/16 nm 09/19/16 nm

2. 95% reduction of total P in removal tank (Note active orthophosphate is almost completely eliminated.)

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ANALYTICAL RESULTS		
Trace Project ID: T16I298		
Client Project ID: Phosphorus Analysis		
<hr/>		
Trace ID: T16I298-02	Date Collected: 09/17/16 13:00	Matrix: Wastewater
Sample ID: Phos Reduction Tank	Date Received: 09/19/16 08:35	
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PARAMETERS	RESULTS UNITS	RDL DILUTION PREPARED BY ANALYZED BY NOTES MCL
<hr/>		
METALS, TOTAL		
<i>Analysis Method: EPA 200.7 Rev 4.4</i>		
<i>Batch: T064124</i>		
Phosphorus	0.51 mg/L	0.050 1 09/21/16 rwa 09/21/16 dtm
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WET CHEMISTRY		
<i>Analysis Method: SM 4500-P-E-11</i>		
<i>Batch: T064104</i>		
Orthophosphate as P	0.093 mg/L	0.010 1 09/19/16 nm 09/19/16 nm

3. Further reductions in the leach lines.



ANALYTICAL RESULTS

Trace Project ID: T161298
 Client Project ID: Phosphorus Analysis

Trace ID: T161298-03 Date Collected: 09/17/16 13:00 Matrix: Wastewater
 Sample ID: North Drain Pipe Date Received: 09/19/16 08:35

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED BY	ANALYZED BY	NOTES	MCL
METALS, TOTAL							
<i>Analysis Method: EPA 200.7 Rev. 4.4</i>							
<i>Batch: T064124</i>							
Phosphorus	<0.050 mg/L	0.050	1	DB/2/1/16	nws	09/21/16	dlm
WET CHEMISTRY							
<i>Analysis Method: SM 1950.P.E.11</i>							
<i>Batch: T064104</i>							
Orthophosphate as P	0.034 mg/L	0.010	1	09/19/16	nm	09/19/16	nm

Bill is a chemist and correctly points out that the orthophosphate is what is available for algae growth. More significant is that this is what is being released to the soil in the leachfield so a great deal of further reduction will be occurring as it passes through the soil into the groundwater, and then it must still move to the lake itself through more soil. It is unlikely that Silver Lake is getting a single molecule from Bill Bryker's septic tank.

We used Bill's experience to construct a proprietary PhosphoHammer™ in response to Leelanau County's new mandate that any new system within 500 feet of any water body needs phosphate removal. Their limit is a reduction to less than 2 mg/l total phosphate. Our first system at a residence on the shore of Sutton's Bay has now had 4 quarters of samples.

1. The first sample met their standard but showed that we need to tweak the system.

		4125 Cedar Run Rd., Suite B Traverse City, MI 49684 Phone 231-946-6767 Fax 231-946-6741 www.sosanalytical.com	
COMPANY:	SLUDGE HAMMER GROUP LTD	SOS PROJECT NO:	180499 - 1
NAME:	[REDACTED]	SAMPLED BY:	WILL SLUDGEHAMMER
PROJECT NO:	[REDACTED]	DATE RECEIVED:	2/8/2018
WSSN:	[REDACTED]	TIME RECEIVED:	12:00 PM
WELL PERMIT:	[REDACTED]	SAMPLE ID:	PUMP TANK
TAX ID:	[REDACTED]	DATE SAMPLED:	2/8/2018
LOCATION:	LEELANAU	TIME SAMPLED:	11:00 AM
	MI	SAMPLE MATRIX:	WASTEWATER
COUNTY:			
TWP:			

INORGANICS

Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Reg Limit(MCL)
BOD 5-DAY SM5210-B	6	4	mg/L (PPM)	AD	2/14/2018	
NITROGEN, AMMONIA - EPA 350.1	2.34	0.50	mg/L (PPM)	KMJ	2/13/2018	
NITROGEN, NITRATE - EPA 300.0	14.4	0.3	mg/L (PPM)	KMJ	2/9/2018	
NITROGEN, NITRITE - EPA 300.0	ND	0.15	mg/L (PPM)	KMJ	2/9/2018	
PHOSPHORUS-TOTAL EPA 365.4M	1.85	0.15	mg/L (PPM)	KMJ	2/9/2018	
RESIDUE, NON-FILTERABLE(TSS)/SM2540D	6	1	mg/L (PPM)	AD	2/9/2018	

2. The second sample showed the system maturing and performing at a higher level. (The high solids come from dust from the phosphate removal material in the removal tank.)



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COMPANY: SLUDGE HAMMER GROUP LTD
 NAME: ██████████
 PROJECT NO: ██████████
 WSSN: ██████████
 WELL PERMIT: ██████████
 TAX ID: ██████████
 LOCATION: SUTTONS BAY
 MI
 COUNTY:
 TWP:

SOS PROJECT NO: 182404 - 1
 SAMPLED BY: SLUDGEHAMMER
 DATE RECEIVED: 6/6/2018
 TIME RECEIVED: 1:05 PM
 SAMPLE ID: EFFLUENT
 DATE SAMPLED: 6/6/2018
 TIME SAMPLED: 12:30 PM
 SAMPLE MATRIX: WASTEWATER

INORGANICS/WET CHEMISTRY/METALS

Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Req Limit(MCL)
BOD 5-DAY SM5210-B	4	2	mg/L (PPM)	AD	6/11/2018	
NITROGEN, AMMONIA - EPA 350.1	0.11	0.10	mg/L (PPM)	KMJ	6/7/2018	
NITROGEN, NITRATE - EPA 300.0	3.43	0.50	mg/L (PPM)	KMJ	6/8/2018	
NITROGEN, NITRITE - EPA 300.0	ND	0.25	mg/L (PPM)	KMJ	6/8/2018	
PHOSPHORUS-TOTAL EPA 365.4M	0.20	0.05	mg/L (PPM)	KMJ	6/8/2018	
RESIDUE, NON-FILTERABLE(TSS)/SM2540D	142	10	mg/L (PPM)	AD	6/8/2018	

3. Sample taken from the pump tank that goes the drip field.



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COMPANY: SLUDGE HAMMER GROUP LTD
 NAME: ██████████
 PROJECT NO: ██████████
 WSSN: ██████████
 WELL PERMIT: ██████████
 TAX ID: ██████████
 LOCATION: SUTTONS BAY
 MI
 COUNTY: LEELANAU
 TWP:

SOS PROJECT NO: 186904 - 1
 SAMPLED BY: NOT REPORTED
 DATE RECEIVED: 12/19/2019
 TIME RECEIVED: 12:30 PM
 SAMPLE ID: OUTLET
 DATE SAMPLED: 12/19/2019
 TIME SAMPLED:
 SAMPLE MATRIX: WASTEWATER

INORGANICS

Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Req Limit(MCL)
BOD 5-DAY SM5210-B	< 4	4	mg/L (PPM)	KMJ	12/24/2018	
NITROGEN, AMMONIA - EPA 350.1	ND	0.05	mg/L (PPM)	KMJ	12/26/2018	
NITROGEN, NITRATE - EPA 300.0	0.31	0.3	mg/L (PPM)	KMJ	12/19/2018	
NITROGEN, NITRITE - EPA 300.0	ND	0.15	mg/L (PPM)	KMJ	12/19/2018	
PHOSPHORUS-TOTAL EPA 365.4M	0.31	0.05	mg/L (PPM)	KMJ	12/21/2018	
RESIDUE, NON-FILTERABLE(TSS)/SM2540D	10	1	mg/L (PPM)	KMJ	12/21/2018	

4. The fourth and most recent sample shows no deterioration after more than one year.



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 NAME: ██████████
 PROJECT NO: ██████████
 WSSN: ██████████
 WELL PERMIT: ██████████
 TAX ID: ██████████
 LOCATION: ██████████
 SUTTONS BAY
 MI
 COUNTY: LEELANAU
 TWP: ██████████

SOS PROJECT NO: 190761 - 1
 SAMPLED BY: BLAKE
 DATE RECEIVED: 3/5/2019
 TIME RECEIVED: 2:00 PM
 SAMPLE ID: OUTLET
 DATE SAMPLED: 3/5/2019
 TIME SAMPLED: 11:00 AM
 SAMPLE MATRIX: WASTEWATER

INORGANICS

Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Req Limit(MCL)
BOD 5-DAY SM5210-B	< 7	7	mg/L (PPM)	KMJ	3/11/2019	
NITROGEN, AMMONIA - EPA 350.1	0.18	0.05	mg/L (PPM)	KMJ	3/8/2019	
NITROGEN, NITRATE - EPA 300.0	0.32	0.3	mg/L (PPM)	KMJ	3/6/2019	
NITROGEN, NITRITE - EPA 300.0	ND	0.15	mg/L (PPM)	KMJ	3/6/2019	
PHOSPHORUS-TOTAL EPA 365.4M	0.16	0.05	mg/L (PPM)	KMJ	3/7/2019	
RESIDUE, NON-FILTERABLE(TSS)/SM2540D	2	1	mg/L (PPM)	KMJ	3/8/2019	

The second system in Leelanau is a home on Lake Leelanau. The first sampling showed very low phosphate. The ammonia level was high due to insufficient air as a result of a partially open valve. The air was increased, but even this ammonia will denitrify by the SludgeHammer bacterial blend in the soil.



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COMPANY: SLUDGE HAMMER GROUP LTD
 NAME: ██████████
 PROJECT NO: ██████████
 WSSN: ██████████
 WELL PERMIT: ██████████
 TAX ID: ██████████
 LOCATION: ██████████
 TRAVERSE CITY
 MI
 COUNTY: GRAND TRAVERSE
 TWP: ██████████

SOS PROJECT NO: 190762 - 1
 SAMPLED BY: BLAKE
 DATE RECEIVED: 3/5/2019
 TIME RECEIVED: 2:00 PM
 SAMPLE ID: OUTLET
 DATE SAMPLED: 3/5/2019
 TIME SAMPLED: 11:00 AM
 SAMPLE MATRIX: WASTEWATER

INORGANICS

Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Req Limit(MCL)
NITROGEN, AMMONIA - EPA 350.1	65.0	1.25	mg/L (PPM)	KMJ	3/8/2019	
NITROGEN, NITRATE - EPA 300.0	0.17	0.10	mg/L (PPM)	KMJ	3/6/2019	
NITROGEN, NITRITE - EPA 300.0	ND	0.05	mg/L (PPM)	KMJ	3/6/2019	
PHOSPHORUS-TOTAL EPA 365.4M	0.09	0.05	mg/L (PPM)	KMJ	3/7/2019	

The data from Leelanau will allow us to track phosphate concentration over the next few years to determine when the absorbent material becomes saturated. We have designed the modules with easily removable absorbent packets so they can be removed during the standard maintenance visit when they become saturated. This material can then be recharged at the shop. We will be maintaining a rotating stock of absorbent packets for replacement in the field.