



AQUAFIX
Wastewater Laboratories
University of Wisconsin Research Park

Reducing Sludge in a Wastewater Lagoon

SludgeRx Case Study



INDEPENDENT DATA COLLECTED
AND SUBMITTED BY:

CITY OF SPARTA, GA

Study Highlights

- Over two seasons, an average of 1.93 feet (or 0.31 yards) of sludge was removed from the lagoon system.
- Average BOD removal increased 7% over the treatment period.
- Sludge Rx treatments reduced average fecal coliforms from 713.3 in 2021 to 169 in 2022.
- The City of Sparta saved an estimated \$500,000 in sludge removal costs by using Sludge Rx rather than dredging.

The addition of SludgeRx to this lagoon removed

**up to
4.25 ft**

**of sludge in some areas
with an avg reduction of**

1.93 ft

across the entire lagoon.



Background

The City of Sparta, Georgia George F. Green Water Reclamation Facility was built in 1990. Since its creation, the ponds had never been dredged. Amanda Martin Akins joined the City of Sparta in April 2022 and took over the Wastewater facility in May 22, 2022. She began making operational changes to the facility in Mid-May 2022 and hired additional staff. The ponds had limited aerators and the few that did work tripped out constantly due to electrical issues and clogs. The ponds showed signs of extreme distress and had sludge levels over the recommended optimal operation (7 ft of sludge in 8 ft of water). In June 2022, staff began to bring additional aerators online and repaired the existing aerators where possible. Staff decided to look into alternatives to compact/reduce sludge to extend the life of the pond until a grant for dredging became available (estimated over \$500,000 for removal, drying, testing, etc). The pond would then need to be reseeded after the dredging as well.



Lagoon Information

	Surface Area	Lagoon Depth	Volume	Recommended Detention
Lagoon 1 (Treated)	2.12 acres	8 ft	1.76 mil gal	3.23 days
Lagoon 2 (Untreated)	2.78 acres	10 ft	5.16 mil gal	3.23 days

Lagoon 1 was split into two ‘cells’ and each cell was dosed with 60# of SludgeRx four times over the course of the trial.

Lagoon 2 was left untreated as it started with only 0.5 to 1 foot of sludge.

Timeline

Sludge Rx was applied to Sparta, GA's wastewater lagoon once monthly, 4 times. Twice in Fall of 2021 and twice in early Spring of 2022.

Data was collected before, during, and after the treatment period. Results showed an average of 1.93 feet of sludge was removed from the lagoon system.

Date	Event
February 11, 2020	Initial sludge judge levels
July 13, 2021	Initial jar testing
August 1, 2021	Sludge judge levels
October 18, 2021	1st Sludge Rx application
November 16, 2021	2nd SludgeRx application
December 2021	Break due to low temperatures
December 22, 2021	Sludge judge levels
January 2022	Break due to temperatures
February 28, 2022	3rd SludgeRx application
March 28, 2022	4th SludgeRx application
April 18, 2022	Depth finder levels
August 5, 2022	Sludge judge levels

Abstract

Due to the simplistic design and ease of operation, wastewater lagoons are one of the most common forms of wastewater treatment. These lagoons are efficient in nutrient removal while presenting minimal operational challenges. However, the one issue that operators do face, is the build up of stored solids, in the form of wastewater sludge.

Sludge—whether it’s in a lagoon, oxidation ditch, or aerator—is a rich source of carbon, nitrogen, phosphorus, and all the nutrients at the bottom that make up the “internal nutrient reservoir.” These nutrients are released fastest when waters are warm in the summer. Once the sludge gets a few inches thick anoxic—or anaerobic—activity begins, which releases soluble reactive phosphate, ammonia, and nitrates.

Sludge buildup, over time, presents the operator with one of two options; dredge or treat biologically. The former is often very costly, especially when most lagoons can be found in rural, small-town communities with limited access to resources. Meanwhile, the latter, as you will see in the following study, has been proven to be a much more cost-effective solution.

One such example is the city of Sparta, Georgia. The operator had found out about Aquafix at their previous position at another municipality where they had sought out potential treatment options for their clarifiers as they were having algae buildup. Aquafix was one of the companies they tested products for, and they were impressed with the results. When that operator then came to Sparta and was having issues with sludge buildup, they decided to partner with Aquafix once more as prices were reasonable and the treatments tested well in the past. Sparta operators pulled samples from their lagoon and performed a jar test using Sludge Rx. Initial testing indicated they should see a positive reduction in the ponds, and so they took advantage of Aquafix’s lagoon research program.

Partnering with Aquafix allowed Sparta, Georgia, small community with limited resources, successfully incorporate the innovative biosciences Aquafix provides to remediate their wastewater lagoon.



Treated Lagoon Data Points (sludge depth in feet)

Collection Point	8/1/2021	12/22/2021	4/18/2022	8/5/2022	Total Reduction
1	7	7	6.5	3.25	3.75
2	5	5	4.5	4.5	0.5
3	5	5.5	6	4.75	0.25
4	7	7	7	3.75	3.25
5	8	6	4	4	4.0
6	4	4	4	4	0
7	5	5	5	3.75	1.25
8	6	6	7	4.75	1.25
AVERAGE:					1.78

Control Lagoon Data Points (sludge depth in feet)

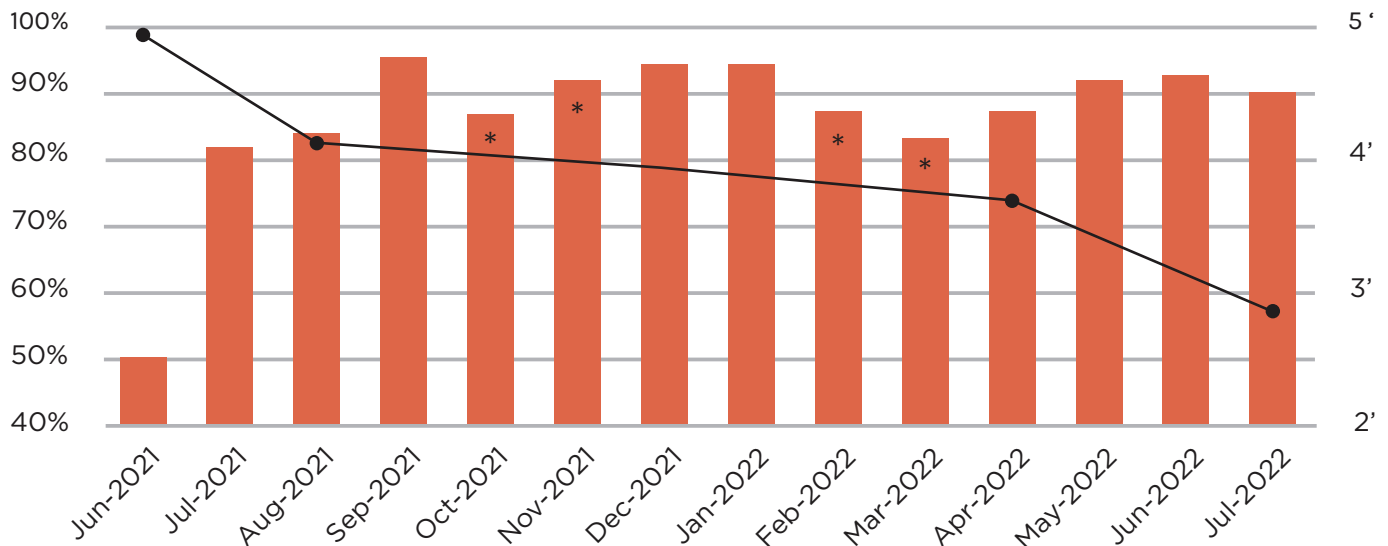
Collection Point	8/1/2021	12/22/2021	4/18/2022	8/5/2022	Total Reduction
1	3	3	2.5	2.5	0.5
2	4	3	2.5	2.25	1.75
3	4	3	2.5	2.75	1.25
4	2	3	2.5	2	0
5	0.5	0.5	0.5	0.5	0
6	2.5	2.5	2.5	2.5	0
7	3	2.5	2	2.25	0.75
8	4	3	2	1.5	2.5
9	3	3	2	2.75	0.25
10	2.5	2.5	2.5	2.5	0
AVERAGE:					0.7

Lagoon BOD Removal

MM/YYYY	SludgeRx Treatment?	Influent BOD	Effluent BOD	BOD Removal Efficiency
06/2021	-	109	54.35	50%
07/2021	-	171	30.7	82%
08/2021	-	156	25.8	83%
09/2021	-	296	14.5	95%
10/2021	YES	238	30	87%
11/2021	YES	217	18.3	92%
12/2021	-	224	14.4	94%
01/2022	-	209.5	13	94%
02/2022	YES	198	23.8	88%
03/2022	YES	268	42.1	84%
04/2022	-	244	30.3	88%
05/2022	-	216.5	17.5	92%
06/2022	-	220	16.1	93%
07/2022	-	204.3	20.8	90%
2021 AVERAGE	-	201.6	26.9	83%
2022 AVERAGE	-	222.9	23.37	90%
TOTAL CHANGE	-	+20.1??	-3	+7%

Average BOD Removal (Bars)

Average Sludge Depth (Line)



*Sludge Rx was dosed in October and Nov 2021 and February and March 2022

Fecal Coliforms (colonies per 100 mL)

MM/YYYY	SludgeRx Treatment?	Influent	Effluent
06/2021	-	-	-
07/2021	-	-	-
08/2021	-	>60,000	280
09/2021	-	11,000	460
10/2021	YES	-	-
11/2021	YES	-	-
12/2021	-	>200,000	1400
01/2022	-	-	-
02/2022	YES	-	-
03/2022	YES	>200,000	82
04/2022	-	-	-
05/2022	-	-	-
06/2022	-	>200,000	256
07/2022	-	-	-
2021 AVERAGE	-	-	713.3
2022 AVERAGE	-	-	169
TOTAL CHANGE	-	-	-544.3

Summary

After treating for four non-consecutive months, the city of Sparta's lagoon system demonstrated Sludge Rx's efficacy in improving wastewater treatment. Sludge levels were reduced by an average of 1.93 feet, with a reduction of almost 5 feet in certain areas. BOD removal was increased from 83% to 90%. Fecal coliforms were reduced to a quarter of the amount contained in the lagoon prior to treatment. Qualitative results were also successfully demonstrated. Water quality was improved, and algae blooms were greatly reduced.

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