

Case Study: Biologic Lagoon Dredge Digests Sludge in a Municipal Wastewater Treatment Lagoon to Forgo Dredging

SUMMARY

A municipal wastewater treatment lagoon had accumulated high levels of sludge after decades of loading and was due to be dredged. They began treatment with Biologic Lagoon Dredge to help digest their organic sludge and forgo dredging. After three months of treatment, the lagoon experienced significant sludge reduction and an excellent return on investment for the municipality.

BACKGROUND

The municipal lagoon is eight feet deep with a design volume of 99 million gallons to perform secondary treatment with aeration after fine screen primary treatment (**Figure 1**). Historically, the lagoon received an average of 2.5 million gallons per day at 112mg/L TSS (2,340lbs/day). The lagoon was measured and found to contain 20.5% sludge. The cost to dredge the entire lagoon was estimated at 2.5 million dollars.

Concerns for the facility included

- High sludge levels in lagoon limiting
- Dredging cost to remove sludge



Figure 1: Aerial view of lagoon before treatment with Biologic Lagoon Dredge

OBJECTIVE

The goal of treatment with Biologic Lagoon Dredge was to reduce the sludge in the lagoon and prevent dredging.

MATERIALS AND METHODS

On May 17-18, 2017, the lagoon was surveyed, before treatment, with sonar to measure the volume of sludge in the lagoon. This process was repeated on October 31, 2017 - November 1, 2017 after three months of treatment with Biologic Lagoon Dredge. Treatment began on July 15th 2017 by initially dosing the lagoon with Biologic Lagoon Dredge at 1ppm of its total volume. Subsequent dosing at a rate of 1ppm of daily flow continued five days a week for three months. Biologic Lagoon Dredge powder was hydrated in water for 1-4 hours prior to dosing. After hydration, the solution was applied directly into the lagoon around its perimeter. Treatment was stopped on October 15th 2017 once the lagoon temperature fell below 50°F.

Table 1: Average lagoon flow and loading data, MGD=Million gallons/day

	Average Daily Flow MGD	Averages of Suspended Solids		Total loading
		mg/L	Lbs./Day	Lbs. over 5 Months
Solids loading	3.08	97.2	2,323	352,835

RESULTS: SONAR DATA REPORT FROM A THIRD-PARTY ENGINEERING FIRM

Sludge volume in the lagoon decreased significantly after treatment despite continuous loading of solids into the lagoon. It was calculated that 425,674 dry pounds of sludge was removed from the lagoon. Since the wastewater treatment plant was continuously adding solids during this time, the total amount of sludge digested by Biologic Lagoon Dredge can be seen as (Total solids before – Total solids after) + solids loaded. The average daily flow and influent suspended solids concentrations are summarized below (**Table 1**).

Given a loading of 352,835 dry lbs. from May through October, it is estimated that 246,985 lbs. would have remained in the lagoon (70% retention based on the engineering firm’s calculations). Therefore, the total sludge reduction by Biologic Lagoon Dredge was 672,659 dry lbs. (425,674lbs + 246,985lbs.).

DREDGING COST AVOIDANCE

The alternative method for disposal of the sludge would be to dredge the sludge from the lagoon, dewater the sludge and then haul it to a landfill. The independent third-party engineering firm estimated that the 1,682 wet tons of sludge removed with Biologic Lagoon Dredge would have cost 4.5x more to remove via dredging than by the Biologic Lagoon Dredge treatment. This cost avoidance was greatly appreciated by the municipality.