

BiOWiSH® Aqua

Water Purification at Thousand Trails Chesapeake Bay in Gloucester, VA

Background

Located in Gloucester, VA, Thousand Trails Chesapeake Bay is an RV campsite and outdoor preserve with over 350 full hookup sites and 25 rental cabins. The site also houses recreational and public facilities, such as lodges, a swimming pool, public restrooms and a dumping station for RV sewage.

RV sewer sites, cabins and public facilities throughout the property discharge to lift stations that pump to one of two separate septic tank/leachfield systems. Four locations were selected for the trial of a new biocatalyst technology that speeds up biochemical reactions significantly faster than unaided processes or current technologies. The technology has been proven as an effective wastewater treatment solution overseas, including Australia, Asia and Europe, and the trial aimed to validate these results in the United States. The park was closed throughout the trial-only a few sites were occupied by employees and seasonal occupants.

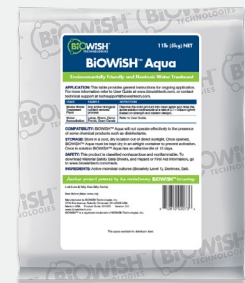
The E Section septic tank/leachfield system receives most of this low-flow volume. In addition, there is a low daily inflow to the only open public restroom, located in Section B. A lift station in Section D that discharges to the E Section tanks was selected for trial due to a consistent problem with odor. The septic tank details are shown in Table 1.

Table 1: Septic tank details and capacities

Tank ID	Size	Daily Input	Receives Wastewater from
E Section Tanks	Sludge Tank: 30,000 gal	< 1,000 gpd	Sections D and E, plus rental cabins
	Central Tank: 5,000 gal		
	Effluent Tank: 15,000 gal		
B Bathroom Tanks	1,500 gal	< 1,000 gpd	Public restroom only
D Section Lift Station	750 gal	< 1000 gal	D Section RV sites, plus rental cabins

Prior to the trial, strong septic odors in the immediate vicinity of D Section lift station were observed. In addition, visible floating sludge in E Section sludge tank and B Section bathroom tank was noticed. The first author approached the campsite owner and operator with a proposal to validate the effectiveness of the biocatalyst in reducing odors within the site, as well as reducing the strength of effluent in the septic tanks.

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- Rapid nitrification and denitrification in aerobic and anaerobic conditions
- Reduces sludge production
- Increases plant treatment capacity
- Reduces odors
- Reduces aeration requirements
- Reduces need for chemical additives
- Improves plant stability
- Pre-treats influent in collection systems
- Natural and non-toxic

Available Sizes

- 100g/3.5oz
- 1kg/2.2lbs
- 5kg/11lbs
- 10kg/22lbs

Objectives

Two primary objectives were developed for this site:

1. To reduce solids, BOD and nitrates in the septic/leachfield systems
2. To reduce odor at the D Section lift station

In order to characterize the cause of the odors, pretreated samples were collected at the effluent section of the E Section tank and analyzed in the laboratory. The results of the analysis (all values in mg/L except turbidity, which is measured in NTU) are presented in Table 2.

Table 2. Effluent Characteristics

BOD	COD	TKN	TSS	Turbidity
110	160	34	91	84

Delivered in freeze-dried powder, the biocatalyst was mixed with water for reactivation. Each dose was pre-batched in five gallon (18 liters) buckets at a concentration of one 100 g bag per bucket (see Table 3). The buckets were filled with water and incubated indoors above 50°F (10°C) overnight (uncovered). The pre-batched doses were applied to the E Section tank and the D Section lift station directly into the tanks through lids. The B Section bathroom tank dose was applied through the toilet. The doses applied to the E Section tank were done in two batches on consecutive days, due to the high pre-mix volume (see Table 4)

Table 3: Detailed implementation plan

Location	Initial Shock Doses (2)
E section	1,200 g
D section	300 g
B bathroom tank	300 g

Table 4: Dosing schedule

Day	Details
1	Collected baseline sample from E effluent tank
2	Applied first doses to D lift station and B bathroom tanks
3	Applied batch 1 of E tank dose (600g)
4	Applied batch 2 of E tank dose (600g)
18	Applied second dose to D lift station and B bathroom tanks
19	Applied batch 1 of second E tank dose (600g)
20	Applied batch 2 of second E tank dose (600g)
34	Collected post-treatment sample from E effluent tank



View inside effluent tank



View inside cover of B section bathroom tank



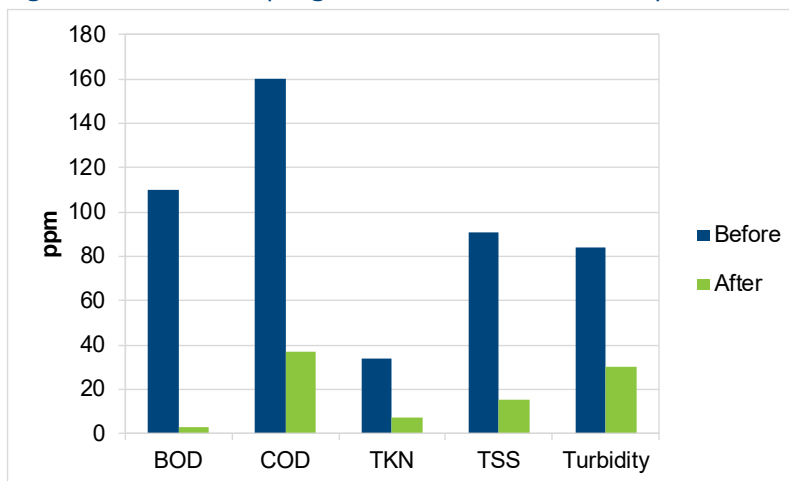
Pre-batching tank doses in 5 gal buckets

Results

After only 34 days, Maintenance Supervisor Hugh Keith reported a significant breakup of the fatty sludge in the E Section sludge tank. He also reported that the odor at the D Section lift station was nearly eliminated. Analytical results for post treatment samples (see Figure 1), collected on day 34 at the E Section effluent tank (all values in mg/L except for turbidity, which is in NTU) showed these outcomes.

By accelerating the digestion of waste through an enhanced enzymatic process, the new technology reduced the volume of activated sludge required to treat a constant loading. As a result, the equilibrium sludge concentration was reduced, and less sludge buildup should occur over the long term. In addition, by altering the speciation of enzymes within the system, the odor was reduced. Odor reduction was achieved both by altering the biotransformation pathways and by enabling the co-metabolism of odorous chemical compounds. In layman's terms, less odor was created in the first place, and the odor that was created was then eaten by the bugs. The entire result was achieved without any capital investment or other alteration of the property's existing infrastructure.

Figure 1: Effluent sampling results, before and after implementation



Conclusion

It is anticipated that continued monthly dosing of the septic tanks would break up solids at the top and bottom of the liquids in each tank to control odor and minimize the need to pump sludge from the tanks. Odor in the D Section lift station can be controlled with consistent dosing applied as needed and in accordance with daily flow, with more frequent applications during heavy use periods. These expected outcomes present significant cost savings of potentially thousands of dollars a month for campsite owners, which includes cost of sludge pumpouts, odor-masking agents and leachfield remediation services. In addition, the reduction of nutrient levels in treated wastewater provides a significant environmental benefit as the campsite is located in Chesapeake Bay Basin catchment area.



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1082-02-EN

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