BiOWiSH™ TECHNOLOGIES

Case Study

Wastewater Treatment

Mission Beach Wastewater Treatment Plant, Washington, USA

Summary

The Mission Beach Wastewater Treatment Plant (WWTP) initiated a field trial of *BiOWiSH™ Aqua FOG* to evaluate the reduction of sludge generated from their facility in Washington. Prior to the application of *BiOWiSH™ Aqua FOG*, the Mission Beach WWTP was spending in excess of $100,000 per year to remove biosolids from the facility and to haul it to a landfill. In addition, effluent turbidity reduced the effectiveness of the ultraviolet (UV) disinfection system. After the trial, *BiOWiSH™ Aqua FOG* reduced sludge generation from the system by over 91%, based on tanker truck sludge hauling volumes. As a result, sludge hauling became less frequent, from every two to three days to once a month. Plant operators also observed a reduction in effluent turbidity, which results in improved disinfection of the effluent discharge.

Background

The Mission Beach WWTP is located in Snohomish County, Washington west of the City of Marysville in a residential development. Owned and operated by the regional council, the WWTP system includes over 32 km of reticulation and collection system piping, 11 pump stations and 45 km of rising mains and is located in sandy, high groundwater conditions.

There are no industrial contributors to the wastewater collection and treatment system. Several commercial facilities discharge sewage to this WWTP; otherwise, all other users are residential. The system is operating well, and the final treated effluent is within permitted effluent discharge conditions. Sludge is wasted to an aerated digester tank and collected for hauling on an "as needed" basis to an authorized sludge treatment facility.

System details:

- Service area population: approximately 3,200 capita
- Collection system type: 100% separated sanitary sewer
- Treatment train: Secondary wastewater treatment (activated sludge) followed by ultraviolet (UV) disinfection
- Design Flow: 616,000 gallon/day, Actual flow: 300,000 gallon/day
- Effluent discharged to the Possession Sound (North) in Puget Sound, approx. 1600 ft. marine outfall pipe; 12-inch diameter pipe; at 51 feet below Mean Lower Low Water (MLLW).

BiOWiSH™ Aqua FOG Benefits

- Reduces sludge production and handling
- Increases plant capacity by reducing contact time (capital avoidance)
- Eliminates odorous emissions
- Delivers substantial energy savings due to reduced aeration
- Minimizes need for chemical additives
- Stabilizes and improves plant treatment performance
- Lowers hydrogen sulphide, ammonia and nitrate levels
- Pre-treats influent in collection systems
- 100% natural and non-toxic

Available Sizes

- 100g
- 1kg

Objectives

The WWTP facility was experiencing significant costs due to the quantity of sludge generation at the plant. Additionally, turbidity in the plant effluent was affecting the effectiveness of the UV disinfection process. Two other minor issues were treatment capacity and process stability. Given these issues the field trial was initiated with the following objectives in mind:

- Cut costs associated with sludge pump out requirements
- Reduce effluent turbidity
- Reduce sludge volume for enhanced treatment capacity
- Improve process stability despite load and flow variations

Figure 1 - Treatment Headworks

Headworks to the Mission Beach WWTP. The overall condition of the plant is well-maintained and the existing treatment system consistently meets permit conditions.

Figure 2 - BiOWiSH™ Dosing system (blue containers on the left side feeding into headworks channel)

Splitter channel and the dosing drums (in blue on the left). The trickle feed tube is fixed to the metal grate.

Solution

BiOWiSH™ Aqua FOG was used to enhance the biological conversion efficiency of the activated sludge treatment process. As a result of the improved conversion efficiency the cellular growth rate was reduced and thus there was corresponding reduction of biosolids generated from the aeration basin. The mixed-liquor suspended solids (MLSS) were maintained at pre-BiOWiSH™ concentrations (approximately 2,200 to 4,500 mg/L) by maintaining the appropriate return activated sludge (RAS) flow rate. As a result of the reduced biosolids production, the waste activated sludge (WAS) flowrate was reduced approximately 50-60%, based on operator observations (WAS flow was not recorded). The WAS flow was sent to an aerated digester tank where additional reduction of the solids occurred. During sludge removal, the digester aerators were turned off and sludge decanted to maximize solids removal and to minimize the hauling of excess water.

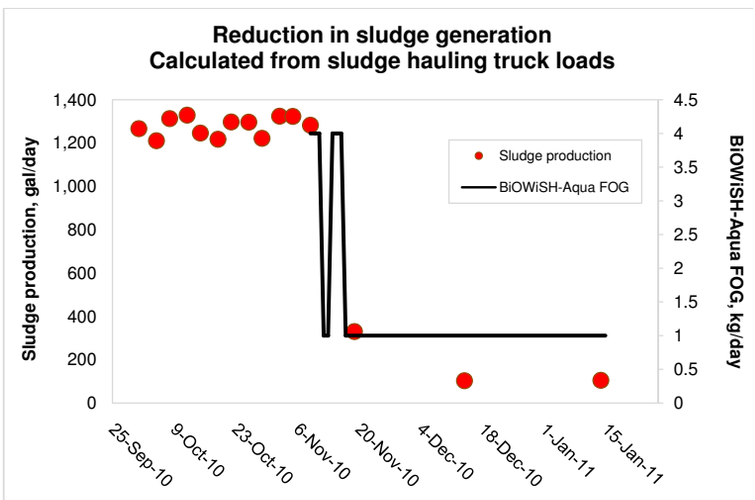
Results

Sludge Reduction

The facility experienced slightly over 91% reduction in total sludge volume generation, as shown in Figure 3. Sludge generation volume was calculated from the sludge hauling rate, with each sludge hauling event representing approximately 3,300 gallons of sludge. The sludge hauling truck was always pumped full of sludge during each removal. The sludge generation rate was calculated by dividing the pumped sludge volume by the amount of time required to generate the sludge.

It appears that the required sludge removal will be reduced from 140 times per year to approximately 10 to 12 times per year. As a result, significant reductions in operating costs were noted. Prior to the application of BiOWiSH™, the Mission Beach WWTP was spending in excess of $100,000 per year to remove biosolids from the facility and to haul it to a landfill. Annual product costs are estimated to be approximately $44,000 per year, and the capital costs of the drums and tubing were around $6,000. Overall reduction in sludge hauling costs are expected to be approximately $85,000 (due to some minor fixed hauling costs), with an approximate pay back period of 6 weeks.

Figure 3 – Over 91% reduction in sludge hauling



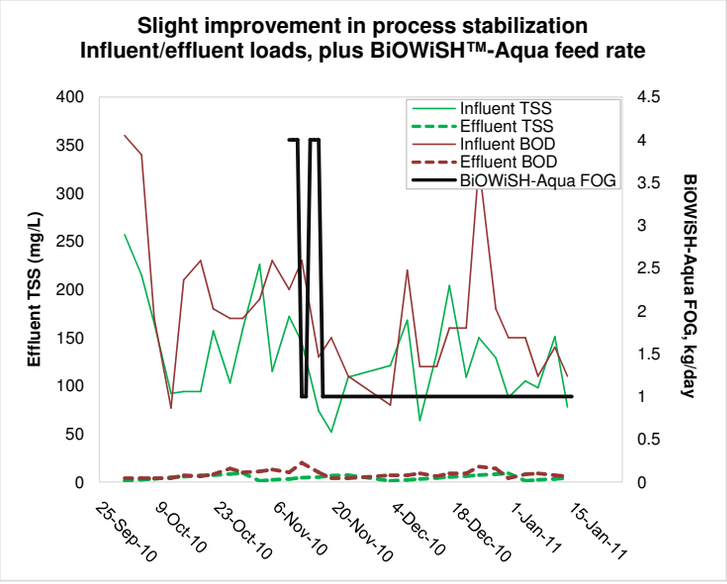
Sludge reduction was due to three factors: decreased biosolids growth rate, enhanced sludge digestion in the aerobic digesters, and improved settling during the sludge decant stage.

"The great reduction in sludge generated by the plant and the associated costs of removal, which were the single largest operating cost item in our annual budget, will allow us to re-allocate these projected savings to other uses".
Cliff Jones, Plant Manager

Treatment Stability and Effluent Conditions

The WWTP was already running an efficient treatment process and so there was only minor improvement in effluent BOD and TSS. However the plant operators noted significant reduction in effluent turbidity. Effluent pH was also noted to be more consistent which has added stability to the overall operation.

Figure 4 – Impact on load variation



Conclusion

BiOWiSH™ Aqua FOG was found to be very effective in meeting all the objectives. It acted as a powerful biocatalyst to improve the biological transformation of the influent BOD, and thus reduce the sludge volume generation. Turbidity reduction was observed in the effluent after application of the BiOWiSH™ product. Significant reductions in sludge generation were noted and the truck loads carrying sludge offsite were reduced.

BiOWiSH™ Aqua FOG has been successful in similar applications and has demonstrated a significant track history of process enhancement at treatment plants around the world. It has proven record of benefit in reductions in solids and sludge bulking issues. It significantly improves the efficiency of aerobic treatment systems, dissolved air flotation units, oil water separators and grease traps.

Implementation Program

Green Bio Solutions, an authorized BiOWiSH™ distributor, led the technology roll-out at the Mission Beach WWTP. *BiOWiSH™ Aqua FOG* was dosed to the aeration channel. Dosing was decided based on the flow rate and BOD load. For product activation, two 55 gallon drums (as shown in Figure 5) were used. The activation period was 24 hours and constant temperature was maintained between 65-70°F. Submersible heaters were used to maintain the constant temperature during the winter months. The initial dosing plan was to require dosing 4 kg per day of *BiOWiSH™ Aqua FOG* for 5 days, after which the dosage was to be reduced to 1 kg per day, respectively equivalent to 3.52mg/L and 0.88mg/L, based on flow rate. The ambient temperature at initiation was about 50 degree F. However, by day 3 the temperature had dropped to about 20 degrees F and based on observing the activated sludge the activation was not going as planned. It took 2 days to obtain drum heaters. In those 2 days the operators dosed 1 kg per day into the system, then went back to the shock dose phase of 4 kg per day for another 3 days.

Once the shock phase was completed, the operators went to daily maintenance dosing of 1 kg per day. Dosing was carried out using peristaltic pump with constant flow.

During the product initiation phase, it was recommended that the dissolved oxygen (DO) concentration in the aerobic treatment process be monitored and augmenting with a portable aerator to maintain DO above 1.0 ppm.

Figure 5 - BiOWiSH™ Dosing Set Up

Contacts

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