



Clean Filtration Technologies, Inc.

CFT Turboclone™ TC-201 Case Study

Successful Three-month Trial on Secondary Effluent Produces Title 22 Reuse Water

Sewer Authority Mid-Coastside Wastewater Treatment Plant, Half Moon Bay, California. During a three-month trial of the CFT Turboclone™ filter, Title 22 reuse water was produced, meeting customer expectations. ▶



Opportunity

The Sewer Authority Mid-Coastside (SAM) Wastewater Treatment Plant was evaluating technologies that would enable them to provide California Title 22 reuse water to irrigation customers within their service region. The ideal solution would be turn-key and operate without additional manpower and training. The CFT Turboclone™ filter offered low-maintenance filtration that would serve as an excellent prefilter to ultrafiltration.

Treatment Goals

The original treatment goal was to produce California Title 22 from secondary effluent. The proposed solution included a 2-inch CFT Turboclone filter with a 20- μ m membrane followed by a 5- μ m cartridge filter prior to an ultrafiltration system from The Dow Chemical Company. The specific objective for CFT Turboclone pretreatment was turbidity reduction from a feed source of >10 NTU to an ultrafiltration feed quality of <5 NTU.

Test Arrangement

A 2-inch CFT Turboclone filter with a 20- μ m membrane was installed. Operation was scheduled for 8 to 10 hours per day and 5 days per week. Other parameters included:

- Flow rate = 35 gpm
- Feed pressure = 20 psi
- Pressure drop = 1 to 3 psi over entire test period

Results

The pilot trial was deemed a successful demonstration of the technology by SAM management. The CFT Turboclone filter consistently delivered filtrate at <5 NTU turbidity and enabled ultrafiltration operation without the intended cartridge filters. Over the course of the trial period the CFT Turboclone filter never required a backwash cycle.

Case Study Details

Background

The Sewer Authority Mid-Coastside (SAM) Wastewater Treatment Plant (WWTP), Half Moon Bay, California, provides wastewater treatment for approximately 25,000 people in the city of Half Moon Bay, the Granada Sanitary District, and the Montara Water and Sanitary District. With the increasing demand for water and the limited supply of fresh water resources, these Mid-Coastside communities began researching the feasibility of reusing its wastewater rather than discharging it to the Pacific Ocean. Six major customers in the area were interested in using this recycled water for irrigation, including a golf course, a plant nursery, and a cemetery. SAM decided to pilot an ultrafiltration system using the CFT Turboclone™ filter as a prefilter.

CFT Turboclone Filter

The CFT Turboclone TC-201 filter is a patented, self-cleaning, low-maintenance device that handles high loads of suspended solids in a single-stage, immediate process. It is specifically engineered to resist fouling and remove solids from difficult-to-treat feed streams through the use of:

- Particle separation by hydrocyclone for large particle removal.
- Cross-flow membrane filtration for smaller particle removal.
- A constant self-cleaning mechanism that virtually eliminates the need for backwash cycles.

Plant Design

The WWTP primary treatment at SAM includes screening, grit removal, and primary sedimentation. The secondary treatment consists of conventional activated sludge treatment, secondary clarification, and disinfection by chlorination/dechlorination. Treated wastewater is discharged to the Pacific Ocean through a 20-inch pipeline, which extends 1,900 ft offshore to a depth of 40 ft.

Project Development

SAM hired an outside engineering firm to research a cost-effective water recycling solution that would produce between 0.6 and 1.35 million gallons per day of California Title 22 reuse water. In addition to being cost-effective, the ideal system would be turn-key and operate without additional manpower and training. Processes initially considered included sand/media filtration, ultrafiltration, ultraviolet disinfection, and reverse osmosis.

In March 2009, Clean Filtration Technologies, Inc., presented results from a recent pilot trial at Bear Valley Water District (BVW) where an ultrafiltration system was paired with a CFT Turboclone filter to produce California Title 22 reuse water from secondary effluent from an aeration pond.¹ Impressed by the results of the BVW trial, SAM contracted with CFT to build a similar system to test this approach with their secondary effluent at Half Moon Bay.

Installation

The proposed system included a cartridge filter, which was found to be unnecessary in the final system (Figure 1). Technicians from CFT equipped a customized mobile trailer (Figure 2) with a 2-inch CFT Turboclone filter with a 20- μ m membrane as a prefilter to an ultrafiltration system provided by The Dow Chemical Company. This system was installed within two months of SAM's original commitment and ran for a total of three months.

The treated water was analyzed both onsite and at an external laboratory to verify that it met the specifications for Title 22 reuse water. The treated water was also transported to a local golf course and nursery for analysis.

Figure 1. Diagram of pilot system.

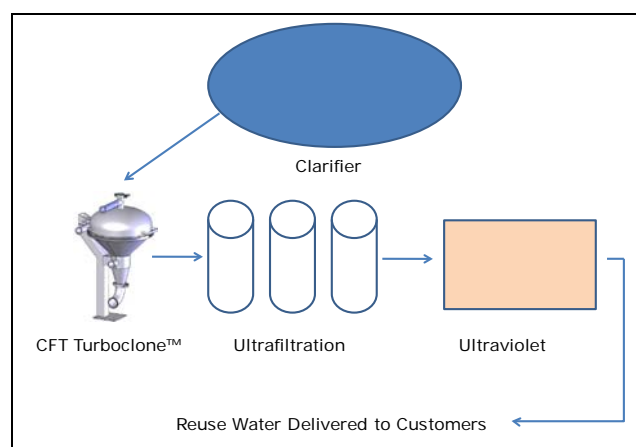


Figure 2. Interior of customized mobile trailer housing CFT Turboclone™ filter and Dow ultrafiltration system.



Water Treatment Performance

During the three-month test period, the filtration system ran for 8 to 10 hours per day, 5 days per week. SAM WWTP technicians recorded turbidity levels daily and conducted comprehensive biological and chemical tests weekly utilizing an external laboratory.

The CFT Turboclone filter reduced turbidity on average from 10.4 NTU to 3.5 NTU, while producing a steady, 35-gpm stream of filtrate (Figures 3 and 4). Although turbidity in the source water was variable, spiking in November and December, the CFT Turboclone filter consistently lowered the turbidity below 5 NTU without altering its level of output.

During the pilot period, the CFT Turboclone filter performed as designed, without a single backwash cycle. The membrane never fouled and required no maintenance or operator intervention. In addition, the CFT Turboclone filter eliminated the need for a cartridge filter, which is generally recommended by the ultrafiltration system manufacturer, thereby reducing the overall operating and maintenance cost.

Figure 3. Turbidity levels for feed water and filtrate from the CFT Turboclone™ filter and from the ultrafiltration system.

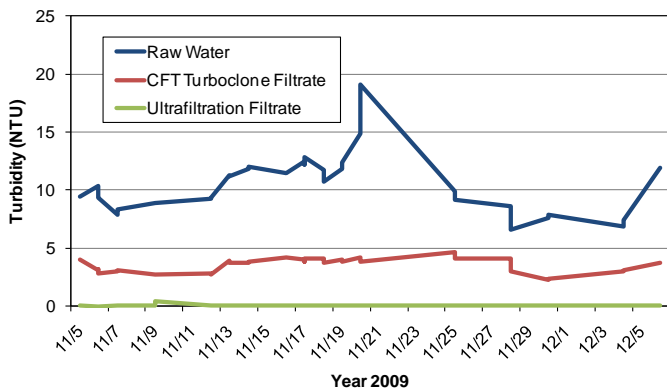
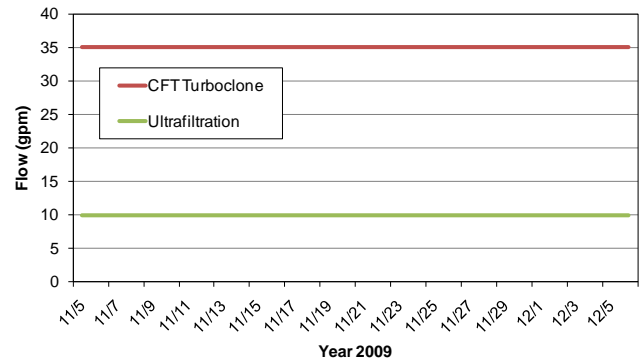


Figure 4. Flow rates for the CFT Turboclone™ filter and for the ultrafiltration system.



Conclusions

Certified test results indicated that the filtration system consistently produced water that met or exceeded California Title 22 standards, and SAM customers who used the treated water for irrigation agreed that it met their needs. In addition, SAM operators endorsed the system for its effectiveness, ease of use, and low maintenance. The pilot was deemed a success.

The system was endorsed by the Sewer Authority Mid-Coastside General Manager, Jack Foley, saying it was “well designed and pretty turn-key and easy for SAM to operate and produce (recycled) water consistently at all times.” Bruce Russell, CEO of Kenmark Group, who was responsible for the golf course, was pleased with the water he tested, saying “There was no odor, no odd coloration, no problem whatsoever with the water.”²

¹ Bear Valley Case Study, CS-TC201-BVW.

² Thomas, Greg, “SAM Turns Up Flow on Recycled Water; Golf Courses Commit to Reclamation Project,” Half Moon Bay Review [Online], <http://www.hmbreview.com/articles/2009/12/01/news/doc4b0d6f474cc54193137918.txt>, accessed 2010-05-06.

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The CFT Turboclone™ filter is manufactured under U.S. patent 7,632,416 with other patents pending. The information contained in this publication is considered accurate and is intended to be used as a guide. This information is subject to change without notification.

Clean Filtration Technologies, Inc., does not assume any liability for the accuracy and completeness of the data in this publication. Temperature ratings, flow rates, and quality of source can be affected by a number of factors. End users should perform their own tests to determine suitability for each application.

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