

# Clean Filtration Technologies, Inc.

## CFT Turboclone™ TC-201

## Case Study

### Pilot Trial Shows CFT Turboclone Filter More Cost-effective than Dissolved Air Flotation as Prefilter to Ultrafiltration

Bear Valley Water District, Alpine, California. During an eight-month trial, the CFT Turboclone™ filter was evaluated as an alternative prefilter to dissolved air flotation in an ultrafiltration system generating California Title 22 reuse water. The CFT Turboclone™ filter was found to be more cost-effective. ▶



### Opportunity

The Bear Valley Water District (BVWD) was issued a discharge permit requiring tertiary treatment of their secondary effluent to ensure compliance. After considering dissolved air flotation (DAF) as a prefilter to ultrafiltration, which would require expensive equipment and installation, BVWD decided to pilot an ultrafiltration system using the CFT Turboclone™ filter as a prefilter. The CFT Turboclone filter offered a nonfouling, low-maintenance alternative to dissolved air flotation.

### Treatment Goals

The original treatment goal was to produce tertiary treated water from an aeration pond. The proposed solution included the CFT Turboclone TC-201 filter with a 20- $\mu$ m membrane followed by a 5- $\mu$ m cartridge filter prior to an ultrafiltration system. The specific objective for CFT Turboclone pretreatment was turbidity reduction from a feed source of >15 NTU to an ultrafiltration feed quality of <5 NTU.

### Test Arrangement

A CFT Turboclone TC-201 filter with a 20- $\mu$ m membrane was installed. Operation was scheduled for 8 to 10 hours per day and 5 days per week. Other parameters included:

- 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 BVWD. The CFT Turboclone filter consistently delivered filtrate at turbidity of <5 NTU and enabled ultrafiltration operation without the intended cartridge filters. The CFT Turboclone combined with ultrafiltration accomplished the treatment goals at less than half of the projected capital cost of the system using DAF.

## Case Study Details

### Background

Bear Valley is a small community located in Alpine, California, with approximately 494 residential customers and 18 commercial accounts. The Bear Valley Water District (BVWD) provides sanitary sewer services to this community as well as the Bear Valley Mountain Resort ski area and Lake Alpine campgrounds. BVWD's secondary wastewater treatment consists of aeration ponds followed by a holding pond where water is stored and eventually sprayed on a neighboring forest reserve.

In 2005, BVWD was issued a National Pollutant Discharge Elimination System (NPDES) permit for seasonal discharge to Bloods Creek. The District found that it needed a way to discharge treated effluent during and following winter seasons with heavy precipitation in order to avoid uncontrolled spills. The NPDES permit required the District to construct tertiary filtration facilities by October 2008 or face steep fines.

To comply with this permit, BVWD retained the services of an engineering company, which recommended a solution that included ultrafiltration and ultraviolet disinfection, preceded by dissolved air flotation (DAF) to address occasional summer algae bloom. This solution would involve a substantial investment in equipment, facilities, and power that would result in a 75% rate increase and an assessment of several thousand dollars per user. As an alternative approach, BVWD decided to pilot an ultrafiltration system using the CFT Turboclone™ filter as prefilter. The cost of the proposed alternative system was less than one-half the cost of the previous recommendation, since it did not require DAF, which would involve a costly power upgrade and increased yearly energy consumption.

### 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:

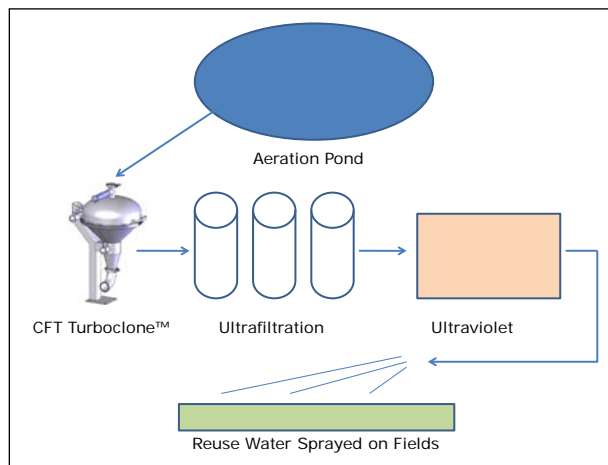
- Particle separation by hydrocyclone for large particle removal.
- Cross-flow membrane filtration for smaller particle removal.
- A constant self-cleaning mechanism that virtually eliminates the need for backwash cycles.

### Installation

CFT recommended that BVWD run the pilot trial for eight months with a scaled-down version of the proposed production equipment (Figure 1) to accomplish the following:

- Validate the proposed system
- Properly size the equipment
- Experience BVWD source water during each season (particularly during the alleged summer algae bloom)

Figure 1. Diagram of the proposed system.



Within two months of BVWD commitment, CFT installed a customized, self-contained mobile pilot unit with the proposed equipment (Figure 2).

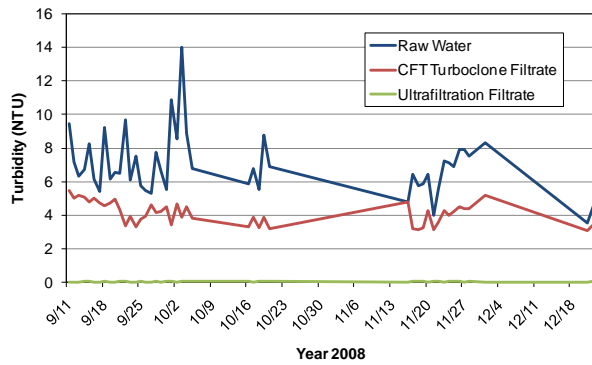
Figure 2. CFT Turboclone™ filter installed as prefilter to ultrafiltration.



### Water Treatment Performance

During the first month of the pilot trial, the CFT Turboclone filter reduced turbidity from 7.44 NTU to 4.43 NTU (on average) while ultrafiltration reduced it further from 4.43 NTU to 0.05 NTU. The CFT Turboclone filter was able to provide a consistent supply of filtered water at less than 5 NTU to the ultrafiltration system, despite elevated turbidity during October and November (Figure 3). No cartridge filter was necessary.

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



Tests were performed with the CFT Turboclone™ filter to demonstrate its ability to filter water with a high concentration of algae. Even at high algae levels, the CFT Turboclone filter reduced turbidity from 91 NTU to 6.6 NTU with a 20-µm membrane.

**Conclusions**

The CFT Turboclone™ filter combined with ultrafiltration successfully produced Title 22 reuse water without the need for a cartridge filter or expensive dissolved air flotation.

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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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