

Leopold's Clari-DAF[®] and Filterworx[®] systems in Florence, CO

Leopold's Clari-DAF and Filterworx systems work in series to increase filter run times, reduce water use, and improve finished water quality for city of Florence

The city of Florence, Colorado Water Treatment Plant (WTP), located 75 miles south of Denver, uses blended surface water taken from the city's southernmost water reservoir. All raw water sources entering the reservoirs flow into the northern reservoir and then into the southern reservoir to ensure the water is thoroughly mixed before entering the pipeline to the plant. The source water, which comes primarily from snow melt, is low in turbidity, alkalinity, minerals, and color. Algae grow throughout the year and can be as high as 400,000 counts during the summer season, causing the surface water to be difficult to treat.

Scope

The treatment scheme at the plant included an up-flow contact clarifier followed by gravity filters to handle average flows of 2 million gallons per day (MGD) in winter and 2.8 MGD in the summer months. The chemical treatment consisted of adding copper sulfate in the reservoir for algae control; and alum fed at 30 mg/L, dry nonionic polymer fed at 0.35 mg/L, and liquid cationic polymer fed at 2 mg/L for the clarification process. This produced clarified water turbidity of 2 NTU and a typical finished water turbidity of 0.2 NTU.

In the summer months, with algae counts at their highest, the utility endured filter run time as short as eight hours. Each filter backwash required 20,000 gallons of water, and the contact clarifier required flushing four to six times per day, using 13,000 gallons of water per flush. Frequent backwash and flushing cycles resulted in the plant producing quantities of finished water far exceeding consumer demand.

In addition to excessive water production, the treatment process resulted in poor color removal, as evidenced by the greenish color tint noticeable during the filling of municipal swimming pools.



The city of Florence, CO emblem

END USER:	City of Florence, CO
CLIENT:	Florence, CO Water Treatment Plant
ORDER DATE:	2004
COMPLETION:	2005

Solution

The Engineering Company (TEC), from Fort Collins, Colorado, recommended increasing plant capacity to meet future growth demands and improving the treatment process for removing algae found in the raw water source. TEC recommended testing a Leopold Clari-DAF (dissolved air flotation) system along with a Filterworx gravity filter. Data collected during the pilot test confirmed the dissolved air flotation process was far more successful at removing algae than the settling clarification process.

Results

The city of Florence began treating its raw water using the newly installed treatment scheme, which consists of a Leopold Clari-DAF system with a rated capacity of 6 MGD through two basins, followed by three dual media Leopold Filterworx filtration systems.

By reducing the filter backwashes and filter-to-waste water as well as eliminating the flushing requirements of the contact clarifier, the in-plant water use has been reduced by 150,000 gallons per day.

Plant personnel have discontinued the use of copper sulfate for algae control, since the Clari-DAF system effectively removes 99 percent of the raw water algae.

Additionally, they have also switched the coagulant feed to polyaluminum chloride, with dosage reductions to 11 mg/L in winter and 17 mg/L in summer, and – only when raw water quality requires it – an additional 0.25 mg/L of nonionic polymer. This treatment has resulted in average filter run times of 72 hours, a nine-fold increase over previous treatment, producing a finished water quality through the filters of less than 0.04 NTU.

Finally, the true color in the effluent is zero, resulting in noticeably clearer water in the municipal swimming pools.



Inside view of the city of Florence WTP

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