

Leopold Clari-DAF[®] System at Evitts Creek, PA WTP

Dissolved air flotation system removes algae and manganese at Evitts Creek plant

The Evitts Creek Water Treatment Plant (WTP), owned and operated by the city of Cumberland, Maryland, is located just over the state border in Bedford, Pennsylvania. It provides potable water for Cumberland and surrounding communities in Maryland, West Virginia, and Pennsylvania. The plant treats raw surface water taken from the Lake Gordon reservoir.

Scope

The original 12-million gallons per day (MGD) plant had a treatment scheme with rapid mix, upflow clarifiers, filters, clearwell, and a contact tank, along with vacuum drying beds for sludge dewatering. The influent turbidity averaged 3 NTU with influent soluble manganese levels averaging 0.1 mg/L, but peaking at 0.172 mg/L. Potassium permanganate (KMnO₄) was fed regularly at the intake for taste & odor (T&O) control, as well as to oxidize the manganese for removal in the clarification stage of the treatment process. The plant feeds inorganic flocculant and polymer for clarification, caustic for corrosion control, fluoride and chlorine for disinfection, and ammonia to form chloramines to carry the residual through the large distribution system.

In addition to the soluble manganese problem, increased agricultural run-off and a reduction in the surrounding forestry caused progressively higher algae blooms during the summer months. These conditions created severe T&O problems, shortened filter run times, and left discoloration and staining in consumers' homes from manganese residual.

After investigating alternative clarification technologies, the city of Cumberland's consulting engineer recommended replacing the five filters with a dissolved air flotation (DAF) clarification system to solve the problem of increased algae and improve manganese removal.



The Lake Gordon reservoir

END USER:	City of Cumberland, MD
CLIENT:	Evitts Creek WTP
ORDER DATE:	2002
COMPLETION:	2002

Solution

A Leopold Clari-DAF® mobile pilot plant was brought on site to determine the process effectiveness and develop design criteria. During the six-week pilot study, the dissolved air flotation system effectively removed algae and manganese and produced a consistent effluent quality for filter loading, maximizing the filter run times between backwashes. Notably, the pilot unit also increased sludge solids in the float, which would lead to cost savings by eliminating additional processing steps and reducing sludge dewatering when operating the full scale installation. The unit's smaller footprint allowed the water utility to handle an estimated 36 percent increase in plant capacity without increasing plant size.

Following the successful pilot, the city of Cumberland installed three Clari-DAF systems designed at 5 MGD apiece, each with dual flocculators, required pumps, saturation tank, and controls.

Results

The Clari-DAF effluent turbidity is consistently below 0.2 NTU and has increased filter runs from 24 hours between backwash cycles to the Pennsylvania State regulatory recommended maximum of 72 hours. The T&O problems have been resolved, soluble manganese in the finished water is now below 0.02 mg/L, and the process obtains a minimum of 85 percent removal of the incoming algae.

Effluent water quality and subsequent filter run times continue to exceed expectations with the Leopold Clari-DAF system in place, and with maintenance requirement less than anticipated, the plant operators have experienced more time to accomplish other tasks during their regular shift.

The Clari-DAF system produces sludge cake ranging from 16 percent to 22 percent solids, as compared with the 5 percent cake solids produced by the old vacuum drying beds. The belt press processes a one-week accumulation of sludge in 10 to 14 man-hours rather than the 48 to 60 man-hours previously required, reducing the overall costs of solids handling and disposal operation by more than 60 percent.



The Leopold Clari-DAF system at work

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