



OptiFiber® Cloth Media Filtration for Drinking Water Applications

Cloth media filtration has been used in the United States since the early 1990s. This technology has been used in a variety of applications including tertiary wastewater, primary wastewater, wet weather overflow, and industrial surface water treatment. Improvements in media design continue to expand the number of applications for cloth media filtration. One innovative application for cloth media filtration is drinking water pretreatment. This application benefits from several advantages of cloth media filtration including a small footprint, the ability to handle high solids concentrations, low energy consumption, and the ability to produce high quality effluent. Aqua-Aerobic Systems offers five pile cloth media options in a variety of mechanical configurations to provide a custom solution for each project. This document summarizes one full-scale installation and one long-term pilot study to demonstrate the performance of cloth media filtration using OptiFiber® cloth filtration media for drinking water pretreatment.

Drinking water pretreatment can be in the form of pretreatment for a conventional drinking water facility or a membrane treatment facility. One example of pretreatment for a conventional drinking water treatment facility is located at Chigwell Water Treatment Works in the United Kingdom. This facility uses large reservoirs to store drinking water prior to treatment, which are shown in Figure 1. As part of the treatment process, rapid gravity sand filters are followed by deep bed sand filters to maximize solids removal. During the summer, these reservoirs see large algae blooms that had been causing clogging issues in the existing sand filters. One cloth media filter (Figure 2) was installed in 2017 to reduce the algae prior to the conventional drinking water treatment process.



Figure 1: Chigwell Water Treatment Works (Google Earth)



Figure 2: Cloth Media Filter at Chigwell Water Treatment Works

Testing for similar applications has been completed at two other sites in the UK by Thames Water. An important aspect of these studies has been identifying the algae species present. Spring algae blooms tend to be single celled diatoms that penetrate the rapid gravity sand filters and are caught by the slow sand filters, which greatly increases the required cleaning frequency in the slow sand filters. During the summer months, the algae becomes more filamentous in nature. This type of algae blocks the rapid gravity filters, which prevents flow to the slow sand filters. In both cases, the water production at these facilities is decreased. Other methods commonly used to help reduce algae require use of chemicals. Chemical use is not an option for these facilities because chemicals are prohibited for treatment purposes. In addition, chemical systems of this type would be very expensive to build and operate.

Chlorophyll-a is commonly used as a measure of the algae concentration coming to a treatment facility. Figure 3 shows the reduction in chlorophyll-a across a cloth media filter treating water from a large storage reservoir at Coppermill Lane Water Works with OptiFiber UFS-9™ cloth filtration media from March through September 2017. The chlorophyll-a concentration was low throughout most of the year with a small increase in April and a sustained increase in the late summer and early fall. Filtrate chlorophyll-a was consistently low throughout the year.

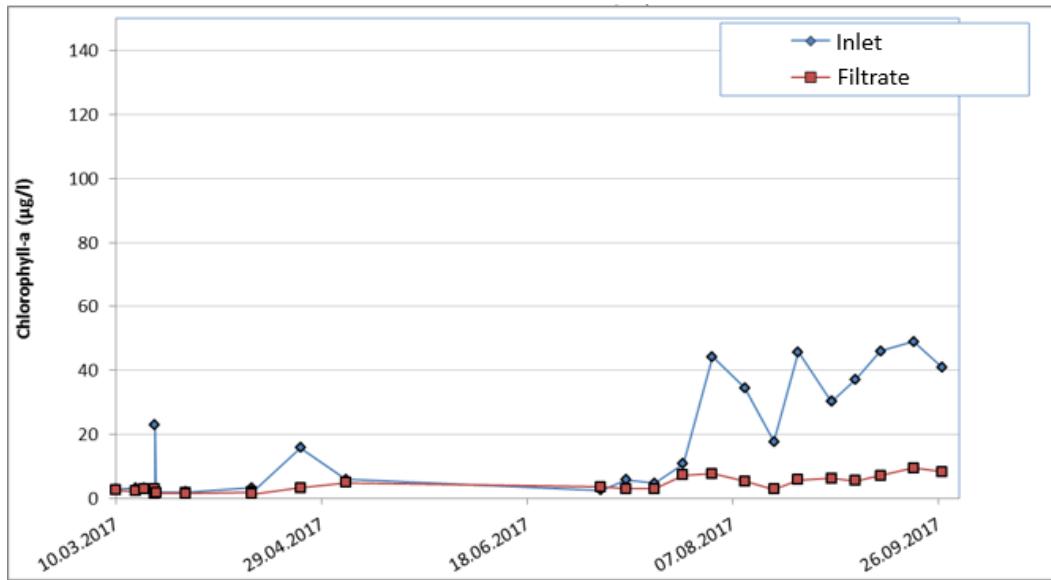


Figure 3: Inlet and filtrate chlorophyll-a concentrations from March through September 2017 at Coppermill Lane Water Works

Percent removal in chlorophyll-a is expected to increase as the inlet concentration increases. Figure 4 shows how the predicted increase in percent removal with an increasing influent chloophyll-a concentration compares to the actual percent removal at various filter inlet concentrations. In general, the filter performance was in line with the expected performance. Cloth media filter performance becomes more critical as the inlet chlorophyll-a concentration increases. The cloth media filter consistently demonstrated a higher than predicted percent removal at these higher inlet concentrations.

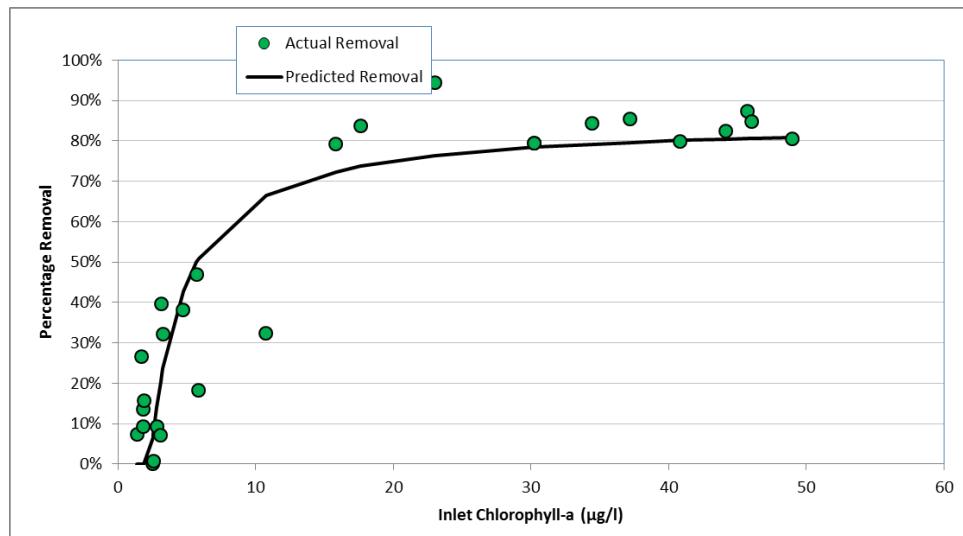


Figure 4: Predicted and actual chlorophyll-a reduction as a function of inlet concentration at Coppermill Lane Water Works

Summary

OptiFiber® pile cloth filtration media has been shown to be well suited for drinking water pretreatment applications. Aqua-Aerobic Systems offers five pile cloth filtration media options in a variety of mechanical configurations to provide a custom solution for each project. Pilot units are available to assess performance prior to installing a cloth media filtration system at a new facility.