Depth Filtration

Depth Filtration Experiments

In previous experimental trials, it appeared that more particles were captured in the top layer than in either of the bottom foam layers. Over time, a film on the top surface of the foam would accumulate, thus leading to more particles being trapped on the surface. This observation is indicative of foam filtration potentially acting as a straining process, which is a function of surface area, rather than as a filtering process, which is a function of filter depth. It is important to understand which parameter guides the filtration performance, as it will ultimately determine which parameter is optimized in the filtration unit design. Therefore, a series of experiments were run in order to determine whether the foam filtration acts as a function of depth, or rather, as a function of surface area.

Experiment 1: 3 inch foam depth, 1.5 mg/L alum dose, 1.16 mm/s, 90 ppi foam

Figure 1 shows that after about five hours of operation the foam filtration system achieved a pC* of greater than 0.9, or an effluent turbidity of less than one. The performance of the foam increased almost linearly over time, suggesting that the film on top of the foam increases filter performance or that previously removed particles within the filter bed improve filter performance. In later experiments, we will determine how long performance will increase before leveling off, and how head loss through the system is affected by the film on top of the foam.

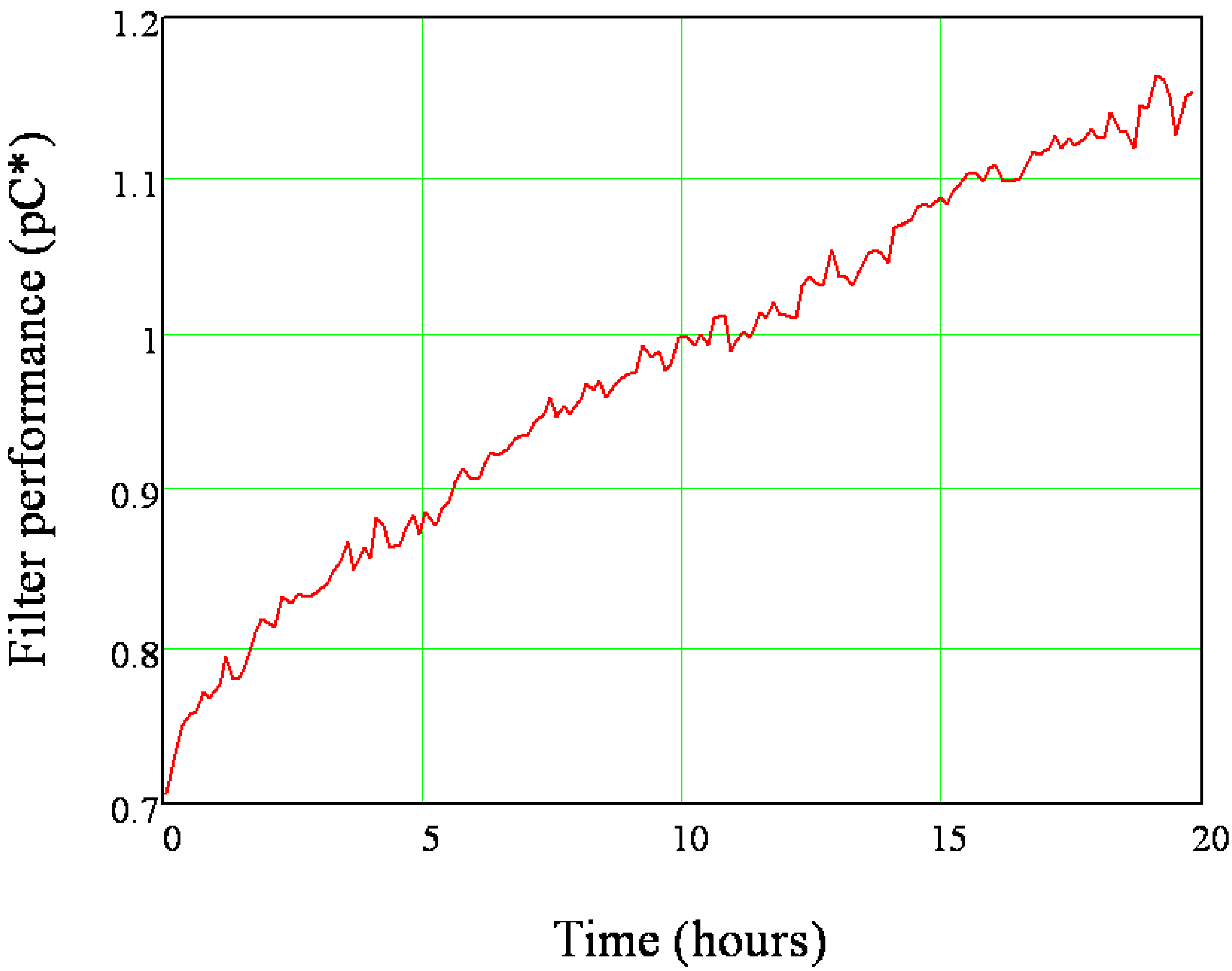

Figure 1: pC vs. Time*

Experiment 2: 1 inch foam depth, 1.5 mg/L alum dose, 1.16 mm/s, 90 ppi foam

When the results of the 3- 1 inch foam sheets are compared with those with the 1 inch foam sheet experiment, it becomes clear that foam filtration is a function of depth. While the three inch foam experiment achieved an acceptable pC*, the one inch foam sheet experiment did not. Even after running for 24 hours, the pC* does not even reach 0.5, which is far below our goal of a pC* of 0.9

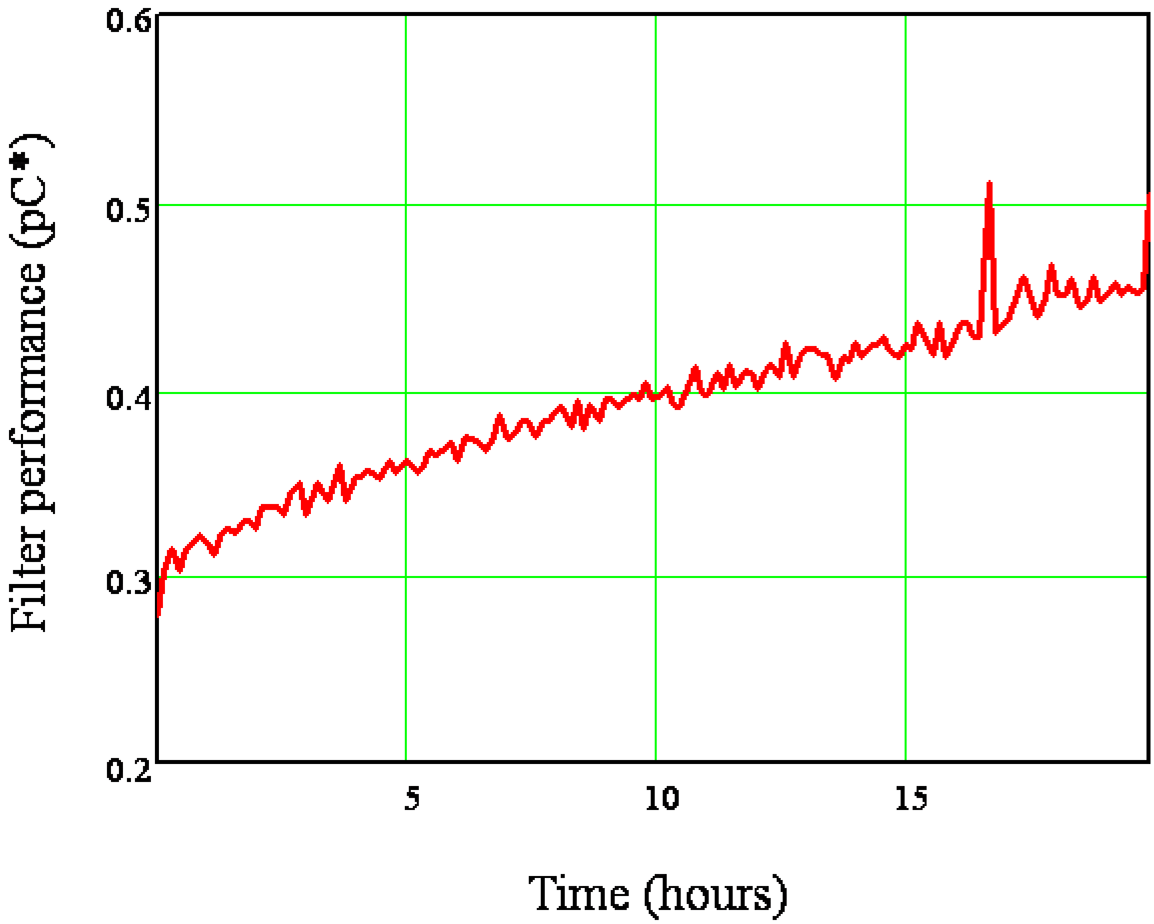

Figure 2: pC vs. Time*