60 ppi Foam

60 ppi Foam Sheet Experiments

Experiment 1.1: 60 ppi foam with a flow rate of 1.15 mm/s.

In the first experiment, a flow rate of 1.15 mm/s was used simply to get an estimate of what level of removal the filter foam material could achieve. A flow rate of 100 m/day was chosen as it is a typical upflow velocity for an AguaClara sedimentation tank. An influent raw water turbidity of 5 NTU was used, which is the typical turbidity of effluent water from an AguaClara sedimentation tank. Alum was not added to the system as we wanted to test the filtering capacity of the foam in the worst case scenario, which is using the smallest level of particles that would be sent through the filter in real life.

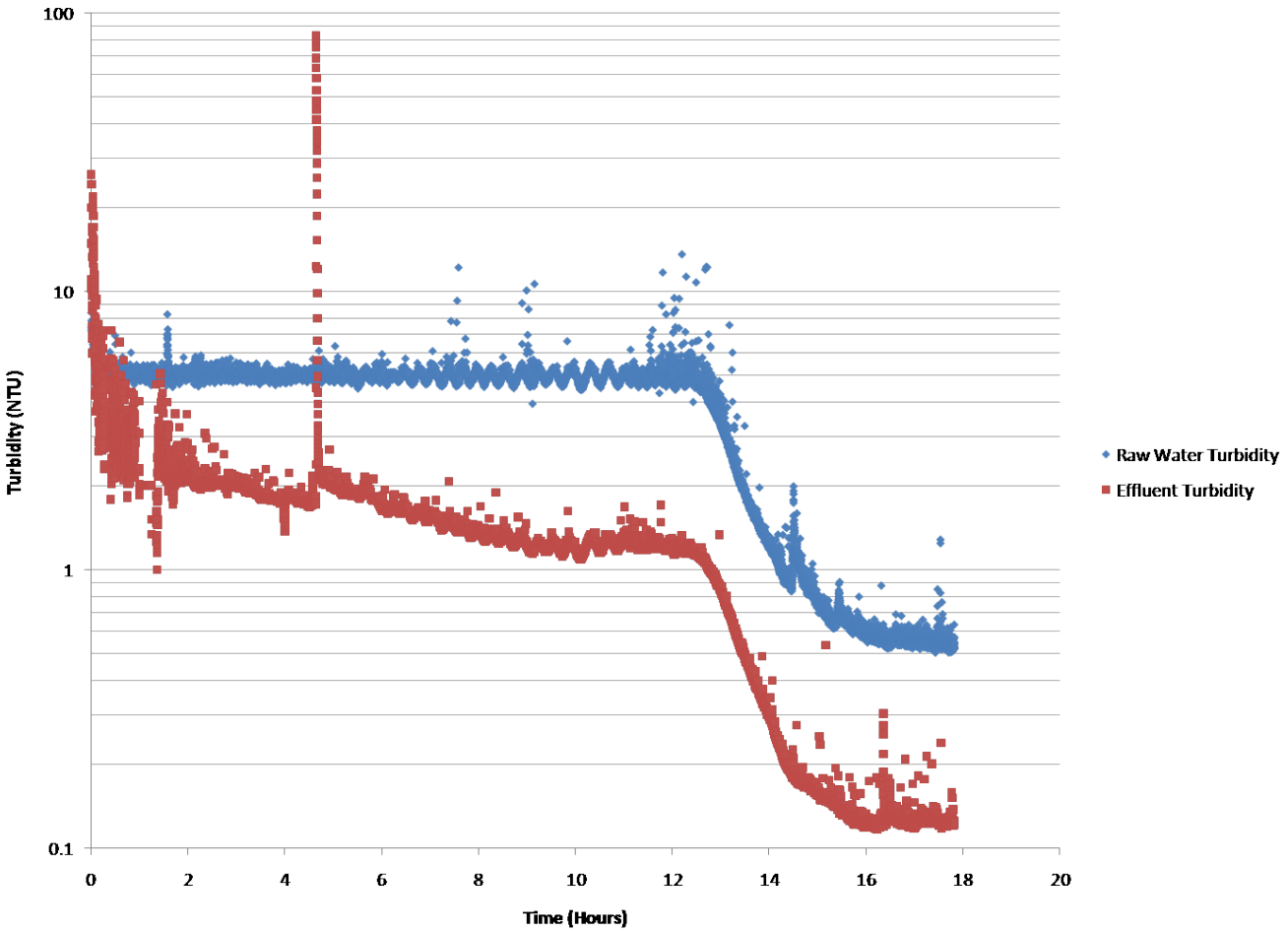

Figure 1: Raw Water and Effluent Turbidity vs. time for a flow rate of 1.15 mm/s
A few things to note about Figure 1:

- When 5 NTU raw water is sent through the filtering device, the effluent water turbidity is about 2 NTU for the first 6 hours and slightly improves to about 1.5 NTU.
- The clay stock ran out after 14 hours, as evidenced by the drop in turbidity in the raw water.
- It is interesting to note that despite the drop in raw water turbidity, the filter is still effective. Raw water of about .6 NTU was filtered to about .12 NTU.

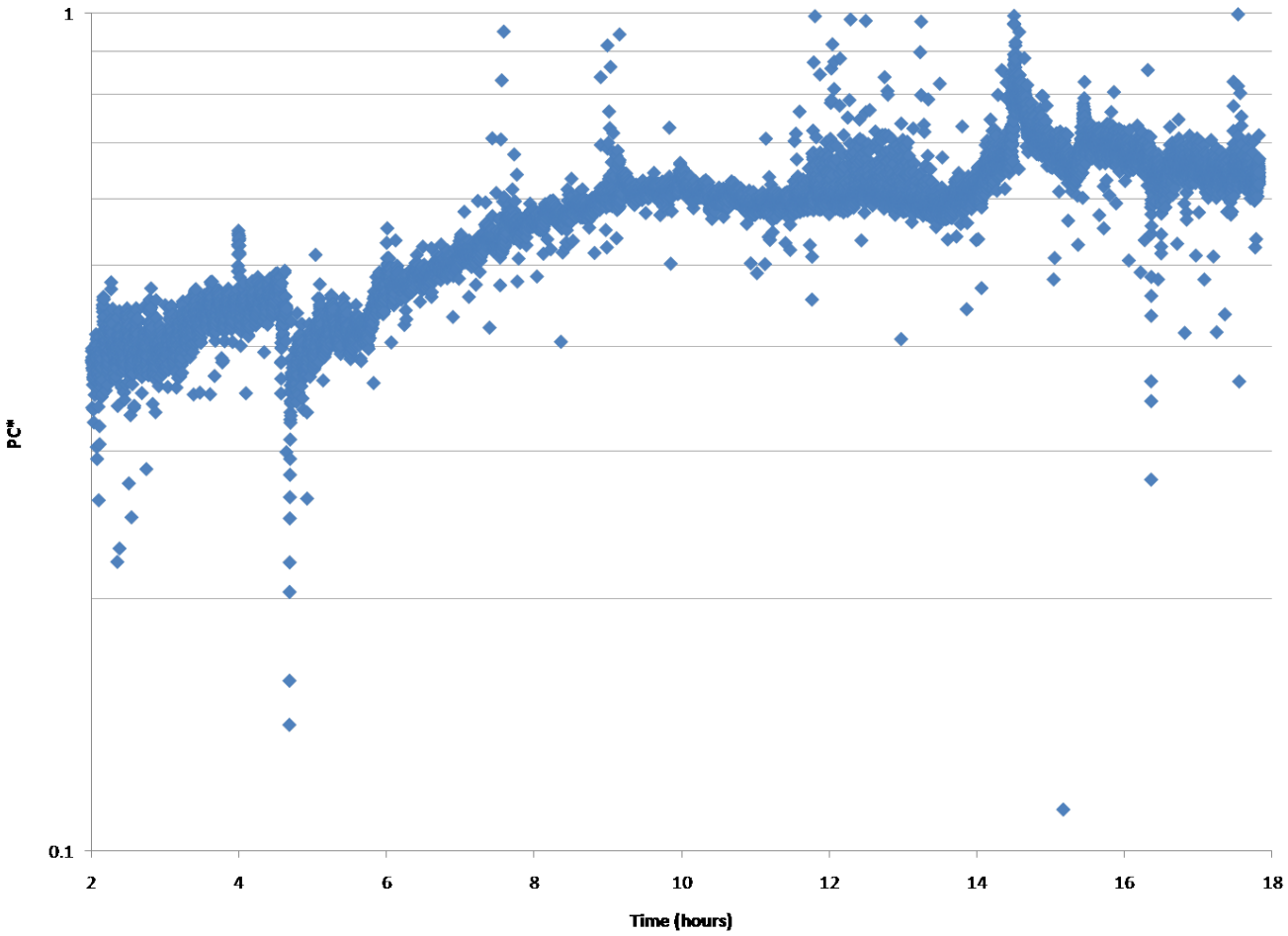

Figure 2: pC vs. time for a flow rate of 1.15 mm/s*

Figure 2 is a plot of pC*, which is the percent of colloid removal.
A few things to note about Figure 2:

- The percent removal is approximately constant with time, though it does show some improvement in the first several hours.
- Even when the raw water turbidity dropped after 14 hours, the percent removal of colloids remained constant. This indicates that the percent colloid removal is independent of influent raw water turbidity, within this range of values.
- While this indicates that the filter material does indeed achieve a significant level of colloidal removal at about 60% , we would like this value to be higher, around 90%.

Experiment 1.2: 60 ppi foam with a flow rate of 2.31 mm/s.

Ultimately, we would like the filtration unit to take up the smallest amount of planned area possible. Therefore, the flow rate through the filter was increased to 2.31 mm/s, which is equivalent of reducing the top view area of the filter to half the original size. The influent raw water was kept as above, at 5 NTU without alum dosage.

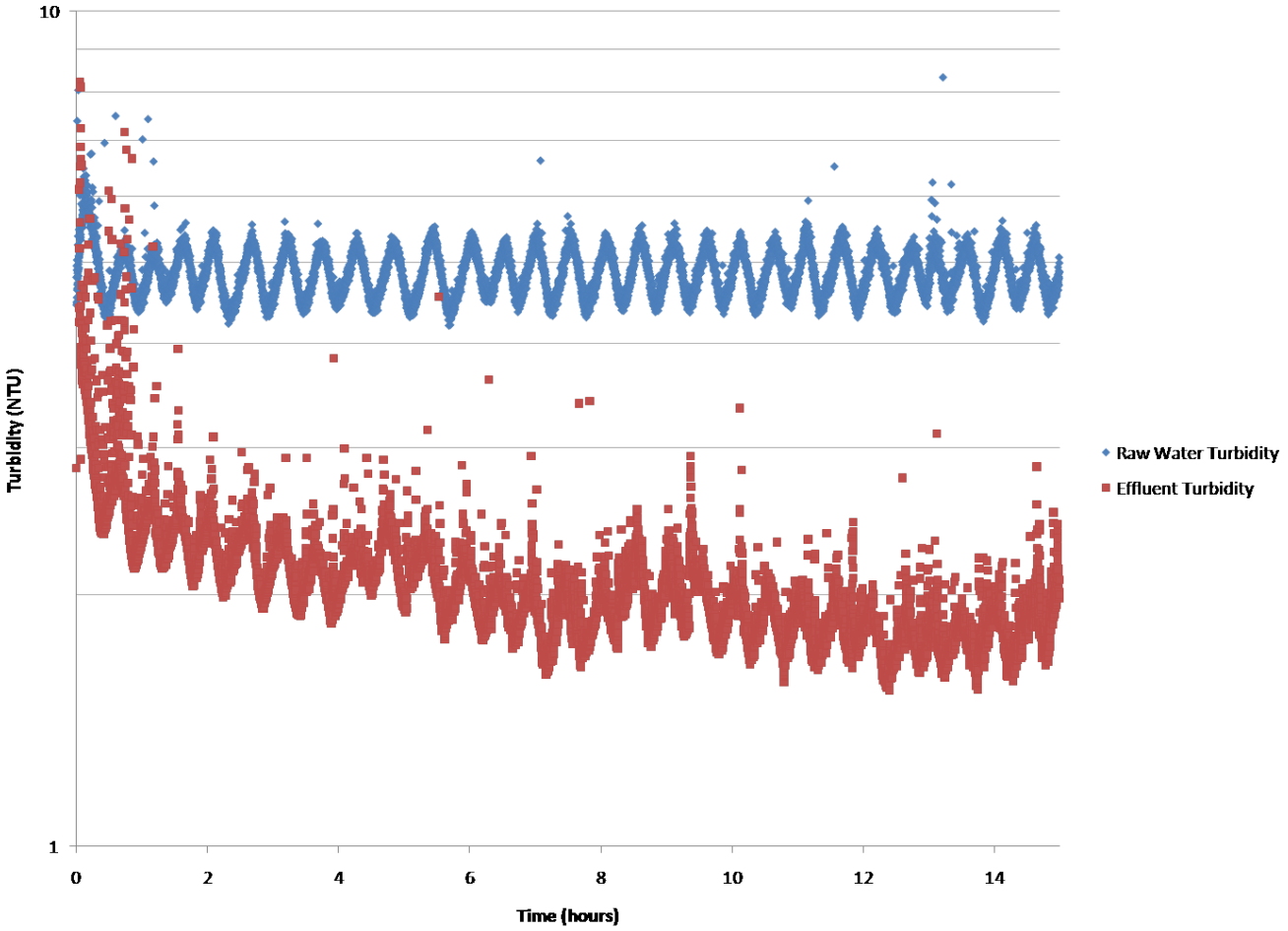

Figure 3: Raw Water and Effluent Turbidity vs. time for a flow rate of 2.31 mm/s

Figure 3 indicates that the higher flow rate of 2.31 mm/s increased the effluent turbidity to about 2 NTU. However, given the amount of planned space saved by the increased flow rate, this level of performance loss may be acceptable.

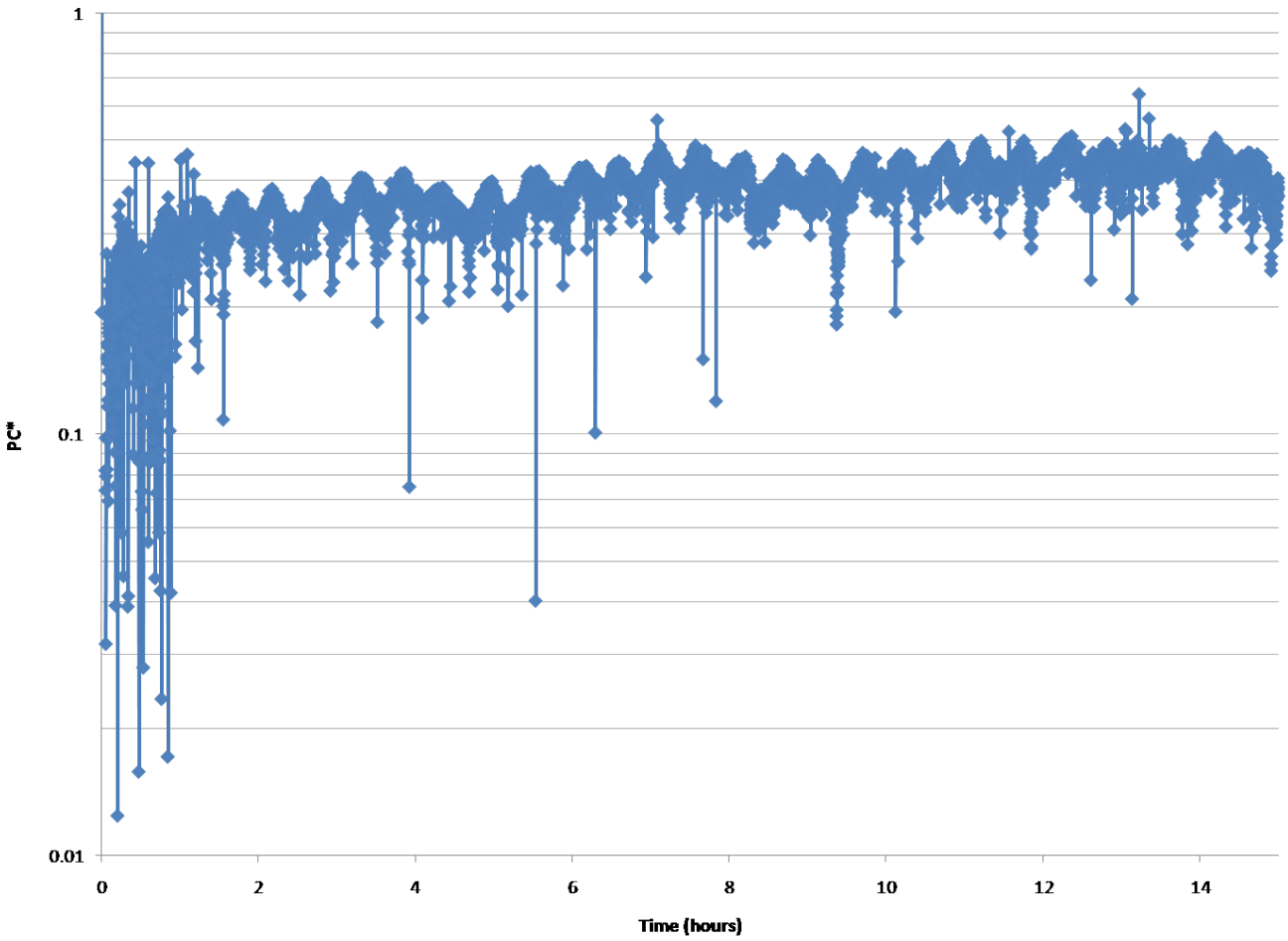

Figure 4: PC vs. time for a flow rate of 2.31 mm/s*

As expected, Figure 4 shows that the percent colloid removal decreased with the increase in flow rate. At 2.31 mm/s, only about 40% of colloids are removed. Again, we would optimally like to achieve a percent colloid removal of about 90%, therefore, we will investigate foam with a higher ppi, which corresponds to a smaller pore size, experiment Set 2: 90 ppi Foam.

Process Controller File