sml258

Spring 2014 Contributions

During Spring 2014 I was a member of the Village Source to Environment team. This team's goal is to design a distributed storage system for a village water supply based on Gufu Village in India. Solar-powered pumps will draw water from a well half a kilometer outside the village and pump it through a transmission line to the village, then through a three-tiered system of pipes to each house. Lengths of tubing at each house will restrict the flow rate and ensure equity, so that no house receives significantly more water than any other house. Our code sizes a PV array and optimizes pipe and tubing sizes based on equity constraints, local weather data, desired flow rate, and system cost.

Summer 2012 Contributions

During the Summer of 2012, I worked on the Foam Filtration team. As a member of this team, I modified the original prototype, increasing filter column length to accomodate high head loss, adding valves to the bottom of the filter columns to facilitate the draining of wastewater while cleaning, and adding pressure sensors to record head loss accumulation. We tested the filter's ability to achieve effluent turbidity at or below the EPA standard .3 NTU, using influent turbidities ranging from 100 to 1000 NTU. Using lab turbidimeters, we recorded effluent turbidity at roughly .01 - .02 NTU, also documenting pC*, head loss, and run time.

We evaluated the effectiveness of the plunger cleaning cycle, finding it capable of essentially "resetting" the foam between tests for the duration of the foam's life, which we estimated at 1 month. Instead of plunging both foam columns upon breakthrough, we determined it is more effective to clean the roughing filter when roughing effluent reaches partial breakthrough (5% of the influent turbidity), and cleaning the finishing filter at the end of the test. This alternative cleaning method permits a longer test duration and is expected to extent the life of the finishing filter.

During early Fall 2012 I co-authored a paper on Foam Filtration, documenting our prototype filter and cleaning cycle performance, and presented our results at the American Water Works Association's Water Quality Technology Conference.