# yh393

## Kelly Huang's Individual Contribution Page

### Spring 2013

As a member of the Design Team, I wrote Mathcad and AutoCAD codes that added end pipes to the flocculator pipes in order to stabilize the system, which becomes important at higher flow rates where baffle spacings are larger. .

### Summer 2013

This summer, I worked with the Surface versus Subsurface team to determine clogging conditions in SRSF and the effects of varying PAC dosages, filter velocity, and influent turbidity on filtration  performance. Our team ran numerous experiments to determine headloss and effluent turbidity patterns for surface and subsurface injection sites and compared the performance and practicality of each.

### Fall 2013

This semester I worked on the ram pump team, and our goal was to modify and improve the AguaClara model in order to achieve the flow rate necessary for installation in Honduras.

Our first task was to construct a head loss generating system that simulates the parameters in Honduras: the water has to be pumped up a vertical height of 7 meters. The system consists of PVC pipes that snake up and down with sharp angles, with the length of the up-flow sections directly related to the head loss generated. Over the course of the semester, we have been able to easily manipulate the amount of head loss by adding or removing sections of PVC pipes.

Next, we modified the design from the previous semester and ran several tests to record the flow rate. In efforts to achieve the highest flow rate possible, we increased the diameter of the drive pipe, tested spring versus swing check valve (we determined that the spring check valve performed better), and modified the wights and springs on the system. However, even our best flow rate was significantly lower than our goal.

In order to further investigate how to improve our model, we obtained a commercial ram pump to study its components. There were three noticeable differences: first, its components were closer together than our model (which reduces energy loss); second, the order of the components were different than ours; and third, it had separate inlet and outlet pipes for the air chamber so that water only travels in one direction, whereas our model only has one pipe, causing the velocity to decrease due to opposing directions of water. After constructing an apparatus to contain and attach the commercial pump to our system, we recorded flow rates that approximately double ours.

Taking these observations into account, we constructed a second model where the components are closer together and with an order similar to that of the ram pump. We tested the flow rate for a few trials and the initial results were promising-- the flow rate of our second model was slightly higher than that of the commercial pump. Even though we didn't have enough time to further improve the design, we are ecstatic about the results and believe that we are heading in the right direction, as there were still several improvements we haven't implemented.

This semester has been wonderful working with my team; everyone was hard working and dedicated to this project, and we have definitely learned a lot from this project and from each other.

### Spring 2014

This semester I am continuing work on the ram pump team; the prototype has been installed in Honduras this past winter break and we will use data collected there to govern our design.

Throughout the semester, we were able to re-construct a ram pump from scratch with the following major modifications: first, the head loss system now uses wrapped tubing instead of PVC pipes, so that the system is a lot more complex; second, the overhead drive tank is elevated to better simulate the Honduras parameters; and third, the air chamber piping is designed so that there are separate inlet and outlet pipes.

In the end, we constructed a successful prototype that was able to deliver water all the way through the head loss system. However, due to time constraints and the lack of a working computer (caused by water mishap in the lab), we were not able to conduct any experimentation.