CDC Goals SP09

Goals for Spring 2009

Subteam Leader: Nadia Siles

Other team members

- Steve Mitchell
- Julia Schoen
- Henry Zeng

Challenges

Linear Chemical Dose Controller

- Test if the pipe is sized too small to accommodate the flow rate which the orifice pattern is designed to deliver and if the LFOM will fail for all flow rates. This hypothesis could be easily tested by using the momentum approach to determine the maximum flow rate out of the bottom of the LFOM for all water depths. This should be tested by doing the analysis in MathCAD. Henry and Steve February 14th

- Develop methods for dosing when the CD is not next to the entrance tank. Maybe we will use a small float tank that is hydraulically connected to the entrance tank or have a pulley system.
    - Sketch Ideas/Design: Henry and Steve, Feb. 27th
        - Issues: How can we remotely control flow based on the entrance tank head. Maybe we can have a device that measures the outflow at the exist.
    - Find relevant published work: Henry and Steve, Feb. 16th
    - Build:
        - Order parts: Henry and Steve, March 2nd
        - Build it: Henry and Steve, March 6th
    - Test it:
        - Evaluate issues with design: Henry and Steve, March 9-20th
        - Design tests to solve issues: Henry and Steve, March 24th
    - Document the design: Henry and Steve, March 31st

- Reassess all of the tubing connections and mechanical design of the dose controller to see if there are improved fabrications techniques that would make the whole system work better.
    - Set up linear CD system (like the one in Tamara) in the lab: Henry and Steve, Feb. 20th
        - Order parts
        - Set-up a meeting with Nicole once it's finally set-up
    - Communicate with APP to figure out how the prototype is working: Nadia, Feb. 15th
    - Experimentally, determine how small the chemical doser vertical drop tubing can be before the open channel flow or free fall fails. Henry and Steve, Feb. 27th
        - Obtain various tubing diameters and test them
        - The size of the open channel flow tube controls the change in the mass of water held by the lever system. This determines the minimum size of the float that will provide a reasonably small dosing error. The size of the float and the length and angle of the lever determines the amount of horizontal motion that the float has. And that determines the minimum size of a small float tank that could be used. We might replace the controller float tank with a large PVC pipe that has a tiny tube connected to its side.
    - For example, it would be possible to eliminate the Guest Fittings and use a hole drilled in a half inch PVC pipe (the open channel flow pipe) to connect the ¼" OD tube from the flow controller to the open channel flow pipe.
    - Test any ideas that arise as we are building the system.

Nonlinear Chemical Dose Controller

- Design a dose controller that will work for chemical flow rates in excess of 400 mL/min. This dose controller would use orifice flow in the entrance tank flow meter and in the flow controller. The design could be used at the Gracias plant.
    - Sketch Ideas: Julia and Nadia, Feb. 20th
        - Issues: Headloss through float valve restrictive. We must focus on the minor losses instead of the major losses.
    - Build: Julia and Nadia, Feb. 27th
    - Test: Julia and Nadia, Feb. 29 - March 11th
    - Document the design: Julia and Nadia, March 25th

Linear Chemical Dose Controller Paper

- Write an initial draft of paper for the Journal of Water Supply: Research and Technology (AQUA) documenting the design and performance of the dose controller. Henry, March 7th

- Create a preliminary outline based on previous research for the automated plant inflow system (APIS). Henry, Feb. 2nd

- Consolidate various bibliographies used by the LFOM, Chemical Doser and Flow Controller teams. Henry, Feb. 27th

- Continue draft of paper for the Journal of Water Supply: Research and Technology (AQUA) with specific data charts and graphs. Henry, Feb. 27th

- Midterm Wiki Report: All, March 13th

MathCAD

- Compile MathCAD files from CD, LFOM, and FC into one APIS file and then show the rest of the team how the code works. Steve, Feb. 17th
- Add a float size algorithm to the current CD Mathcad file: Steve, Feb. 20th
- Use mathcad to determine what size of a float valve is needed to handle flows in excess of 400 ml/min. Steve, Feb. 20th

Miscellaneous

- Follow up: All, By end of semester miscellaneous
    - Create descriptive sketches/animations that will go into the journal article. Also, consider the need for documentation for our future partners: Ecuador and Pakistan.
    - Find a way to effectively provide CDC designs to these new partners
    - Integrate our designs with the Design Team's code

References

- Brikké F and Bredero M, 2003, World Health Organization and IRC Water and Sanitation Centre, Linking technology choice with operation and maintenance in the context of community water supply and sanitation: A reference document for planners and project staff Chapter 6 http://www.who.int/water_sanitation_health/hygiene/om/linkingchap6.pdf

- J TBaker. 2008, MSDS for Aluminum sulfate. http://www.jtbaker.com/msds/englishhtml/a2914.htm

- M Prasanna Kumar, M S Mohan Kumar. 2009. Comparative study of three types of controllers for water distribution networks. American Water Works Association. Journal 101, no. 1 (January 1): 74-86,11 http://proquest.umi.com/pqdweb?index=0&did=1631696711&SrchMode=1&sid=1&Fmt=6&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1234812455&clientId=8424

- Weber-Shirk M, 2009, Gravity powered flow controllers for chlorine and alum dosing. Journal of Water Supply: Research and Technology---AQUA Vol 58 No 2 pp 147-152 © IWA Publishing 2009 http://www.iwaponline.com/jws/058/0147/0580147.pdf