Spring 2011 Team Detailed Task List

Team CDC/LFOM
Updated Detailed Task List: Spring 2011
February 10, 2011

1) Teach all team members to use Mathcad – 2/6/11 – 2/12/11 (all team members)
2) Review work and design algorithms from previous semesters – 2/6/11 – 2/12/11 (all team members)
3) LFOM
    1. Refine LFOM design algorithms – 2/13/11 – 2/26/11 (Adam and Akta)
        a. Zero point investigation
            i. Currently, the LFOM design is based upon a "zero-flow point" elevation where there should be no flow passing through its orifices. However, this zero-flow point is in the center of the first, bottom-most row of orifices; therefore, there is flow when the entrance tank water's level is at the LFOM's zero-flow level. The actual point where no flow occurs is at the base of the first row of orifices. We would like to re-structure the algorithm so that the LFOM's zero-flow point elevation is the same elevation as the actual point where no flow occurs.
        b. Algorithm for choosing most effective orifice size
            i. As flow rates through the LFOM differ (depending on the plant's flow rate in which it is installed), should the orifices' diameter also change?
                1. The number of necessary orifices gets very large with large plant flow rates – can we just make the orifice diameter larger?
                2. Would the number of rows also change?
        c. Investigate oscillatory behavior in first few rows of orifices
            i. Try to reduce any non-linearity in the first few rows
            ii. Will changing the orifice diameter affect this?
    2. Determine optimal number of orifice rows over a wide range of plant flow rates – 2/27/11 – 3/5/11 (Adam)
        a. Is there a better way than just drilling many orifices with high flow rates?
    3. Method to determine the LFOM diameter – 3/6/11 – 3/12/11 (Adam)
    4. Coordinate w/fabrication team to make sure it can be fabricated easily – 3/13/11 – 4/2/11 (Adam and Matt)
    5. Add to the design tool – 4/2/11 – 4/16/11 (Akta)
4) CDC
    1. Investigate the limits of the range of the linear dosing system – 2/13/11 – 2/19/11 (Matt, Chris, Drew)
        a. Find the transition to non-linear dosing system
    2. Determine the optimal diameter and length for the small diameter tube (constraints: distance to lever arm, Reynolds number) – 2/20/11 – 2/26/11 (Matt, Chris, Drew)
        a. At what flow rates must you use multiple small diameter tubes?
        b. Add to the design tool
    3. New ways to connect multiple small diameter tubes to dosing tube – 2/27/11 – 3/5/11 (Matt, Chris, Drew)
        a. How many tubes are too many for the operator?
    4. Examine the possibility of adding grooves to the dose controller's level to allow for higher precision when setting the dose with the slider – 3/27/11 – 4/2/11 (Matt, Chris, Drew)
    5. Determine easy way to calibrate the dose controller in the field – 4/3/11 – 4/9/11 (Matt, Chris, Drew, Adam)
5) Design a chlorine dose controller to replace the current chlorine flow control system – 3/6/11 – 3/19/11 (Matt, Chris, Drew)
    1. Use similar parts as the coagulant dose controller
    2. Coordinate w/filter and design teams as well as AguaClara engineers to determine where to put it
6) Standardize the CDC's components and construction to facilitate its use in any water treatment plants – 4/2 /11 – 4/23/11 (all team members)
    1. Put it into the design tool

7) Develop an easy way for the operator to measure the plant flow-rate – 4/24/11 – 4/30/11 (all team members)
    1. Develop an easy way to mark the current plant flow rate on the entrance tank or lever

Additional possible research topics

1) Examine the sensitivity of the dose controller system to currents in the entrance tank
    1. If the float’s location in the entrance tank changes, can we assume the effect is negligible?
    2. Will this even be a problem with the new entrance tank designs?
2) Investigate whether it’d be easier to cut a sutro weir hole in the LFOM than pipe orifices