Detailed Task List Fall 2013

September 12, 2013

Prepare Flocculator Image/Schematic

Finish by Sep. 20, 2013

- Hand sketches of apparatus set up, including the rigid structure for stabalizing tubes
- Draw in AutoCAD
- Clarify elevations; make sure ceiling is high enough to fit water tank and flocculator

Order Sample Materials

Finish by Sep. 20, 2013

- Compression rods, frame (2-3 pairs/compressions, including nuts and bolts). Purchase tubing for 1-1.25 inch Schedule 80 PVC tubing.
- Tubing joints: PVC Tubing Connectors to hold compression rods together.
- Thin walled metal tubing: This is needed to connect the separate pieces of flexible tubing. The inner diameter of the tubing must be the same as the inner diameter of the flexible tubing and it must be thin enough for the flexible tubing to stretch over it.
- Hose clamps may be needed to enforce the connections between the thin walled metal tubing and the flexible tubing.
- Partially threaded bolts to connect the two compression rods.

Order Water Supply System Materials

Finish by Sep. 27, 2013

- Tank: A tank is needed for a temperature controlled water supply to the flocculator. It should be set up at a height greater than that of the flocculator. Specific calculations for the relative heights are necessary.
- Design an apparatus to plumb the system so it can be backwashed, and (ideally) have the backwash step be under process control so it can happen automatically.
- Design a system that will add a clay stock to your water to achieve a desired influent turbidity. Consider using a recirculating flow through a turbidimeter and process controll software to adjust the addition of clay.
- Order solenoid valve with a orifice diameter of 3.456 mm (or about 5/32"), 110V AC
  - After testing the water coming out of the solenoid valves in the lab, it was established that they are not large enough to supply enough water that is needed for the flocculator.

Test Sample Materials

Finish by Oct. 4, 2013

- Determine whether the sample materials will work by connecting them and making a partial frame.
- Test wiring duct support to make sure it is strong enough to hold up the tubing and it is not creating constrictions of its own.
- Test tubing joints to make sure they fit in the PVC tubing that was ordered.

Order Final Materials

Finish by Oct. 11, 2013

- When all of the samples work and there are no additional changes to the design, the rest of the materials can be purchased.
- If the sample materials ordered were not sufficient, then other materials will need to be researched and ordered.
  - Discuss with Monroe and Paul before making an expensive purchase.

Set Up Water Supply System

Finish by Oct. 18, 2013

- Tap into hot and cold water lines and then route the water to the tank and set up temperature control.
- Set up pressure sensor at the bottom of the tank and connect it to process controller.
- Set up backwash apparatus
- Set up clay stock adding system
- Set up flow control

Construct Flocculator and Other Necessary Components

Finish by Nov. 8, 2013

- Construct the frame for the flocculator and then coil flexible tubing around it.
- Affix outer compressors.
- Construct rapid mix unit for the flocculator and somewhere to dose coagulant.
  - Cosnider using the same rapid mix design as the Flocculation and Sedimentation Optimization team did in Spring 2013 with a jet dosing coagulant and a tube for raw water.

Set Up Process Controller

Finish by Nov. 22, 2013

- Setup process controller to control the pumps, flow and coagulant dosing.
- Make effluent turbidities record in an excel document.

Troubleshoot Flocculator

Finish by Nov. 22, 2013

- Make sure that the flocculator is running the way that it is supposed to and if not, figure out which part is not working.

  - Several factors to consider are the temperature control, wiring duct supports, the PVC rod constrictions, the tube settlers, the turbidimeters, and coagulant dosing.

Imaging Techniques and Flow

Finish by Nov. 22, 2013

- Figure out how much of the flow should be diverted to each section: To a camera to image flocs to determine floc size, to the tube settlers and to the sink.
- Figure out how to change from a circular to rectangular geometry to image flocs, and set up a way for the computer (camera configure?) to take pictures while running experiments.

Perform Experiments

Finish by Dec. 6, 2013

- Using Process Controller, vary velocity and coagulant dosing. The energy dissipation rates and the constritions can also be varied.
- Figure out which of the coagulant doses will help minimize effluent turbidity