Foam Filtration Summer 2014

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Abstract

The Summer 2014 Foam Filtration team will continue to improve the water treatment system, aiming to send a complete filter to Honduras in July 2014. The goal of the summer is to verify the safety of the foam filter itself and to improve and evaluate the design of the filtration system for better performance and easiler fabrication and transportation. The core design from Spring 2014 is the same, with some modifications to ease operator use and increase inficiency. The foam filter will be additionally tested in Honduras.

Detailed Task List:

1 Foam Leaching - Ji Young Kim

Review literature concerning harmful plastics leaching from the foam into the effluent. Also, contact manufacturers about the foam leaching.

2 Chemical Dose Controller -Skyler Erickson

2.1 Build and add the Linear Flow Orifice Meter (LFOM)

2.1.1 Build the LFOM

Consider linear relationship with the holes and flow velocities

2.1.2 Integrate automated chemical dose controlled by the flow rate.

1. Make calculations to design LFOM 2. Find or purchase materials to build LFOM
3. Construct LFOM

2.2 Determine flow rates for the chemical dose controller based on turbidity and influent flow rate.

2.2.1 Determine flow rate to use in head loss calculation.

Consult to the MathCAD file from Fall 2013

2.2.2 Find head loss through the CDC system.

Expecting to find minimum 10 cm based on previous calculations.

2.2.3 Compare the MathCAD formula and real measurement.

2.3 Integrate the LFOM into the filter structure with a concise design.

New lever arm (single-armed) length of 20 in will be installed
Mixed influent should be dripped into the LFOM directly
Float connected to CDC should be heavy enough to keep tension in the line.
Look for past report for CDC on depth of submergence.

2.4 Discuss venting the constant head tank with Casey.

2.5 Evaluate required PACl dosing for successful filter operation based on varied influent turbidities.

3 Compression System - Ethan Keller

3.1 Verify Clean Out Cycle (COC) efficiency.

3.1.1 Test siphon

3.2 Propose alternative compression methods.

3.2.1 Consider light, compact, easy to use, alternative systems. Discuss on the ground issues with Antonio Elvir and Drew Hart.

There will be a video chat meeting on 6/20/14. We are going to ask about more specific local settings and applications.

3.3 Designing final compression system for the straight drum.

3.3.1 Consult Paul and Tim about design and potential alternative compression methods (hydraulic compression methods).

3.3.2 Decide on materials and compile final materials list

3.3.3 Evaluate theoretical load strength of the designed system confirm this is adequate for sufficient compression

4 Experiment - Abby Brown

4.1 Understand the relationship between turbidity and head loss.

4.1.1 Measure head loss at 500 NTU raw water & head loss at breakthrough effluent turbidity

Consult to MathCAD file from spring 2014 (under spring 2014 MathCAD files folder) & ppt's from CEE 4540 website (under summer 2014 reference folder)

4.2 Optimize the system in terms of head loss

4.2.1 Reduce the headloss in the system or extend the length of the filter. (addressed in the Challenges document)

5 Documentation

5.1 Create a user guide

5.1.1 Create step-by-step manual on construction

5.1.2 Create step-by-step manual on operation