American Society of Civil Engineers Environmental Design Competition

CENE 486C - Status Update #3

Alex Anzar, Shelby Carawan
Paige Reilly, Cameron Rhodes

Project Summary

- The 2018 Pacific Southwest Conference (PSWC) will take place April 12th in Tempe, Arizona [1].
- The goal of the project is to design and construct a reusable household water treatment system with a budget of $500 [1].
- The system will be scalable in order to accomodate the needs of communities in developing countries [2].

Figure 1: 2017 PSWC Environmental Competition in Irvine, CA. Photo courtesy of Celine Bannourah.

Schedule

Table 1: Task start and end dates

Task	Original Start Date	Original End Date	Actual Start Date	Actual End Date
4.0 Fabrication	02/11/18	03/01/18	02/06/18	03/02/18
5.0 Prototype Testing	12/11/17	01/18/18	12/11/17	02/28/18
6.0 Finalize Design	01/19/18	03/11/18	01/19/18	02/18/18
7.0 60% Report	03/14/18	03/28/18	03/09/18	03/28/18
8.0 PSWC Requirements	02/12/18	03/11/18	02/18/18	03/09/18

Work Completed: Lab Testing

Table 2: Testing results

Test	Method	Raw Water Results	Testing Results	Ideal Results
Nitrate	HACH 8039	> 50 mg/L	26 mg/L	10 mg/L
Total Phosphorus	HACH 10127	>100 mg/L	180 mg/L	1 mg/L
Total coliforms	HACH 8074	Inconclusive		Not present

Work Completed: Lab Testing

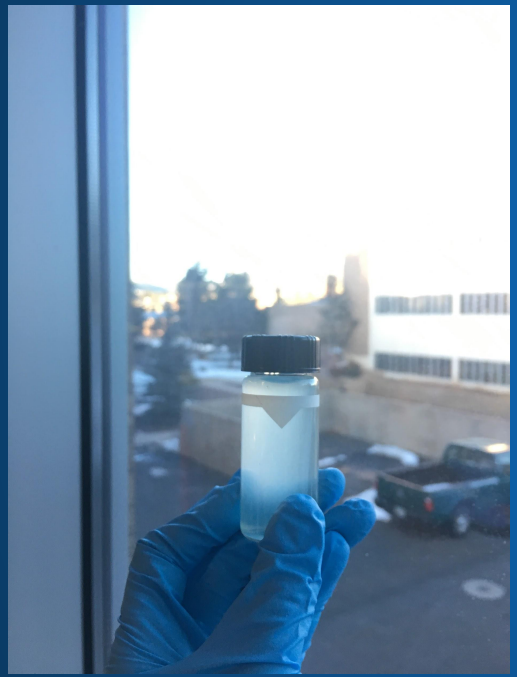

Figure 4: Turbidity testing results. Photo courtesy of Paige Reilly.

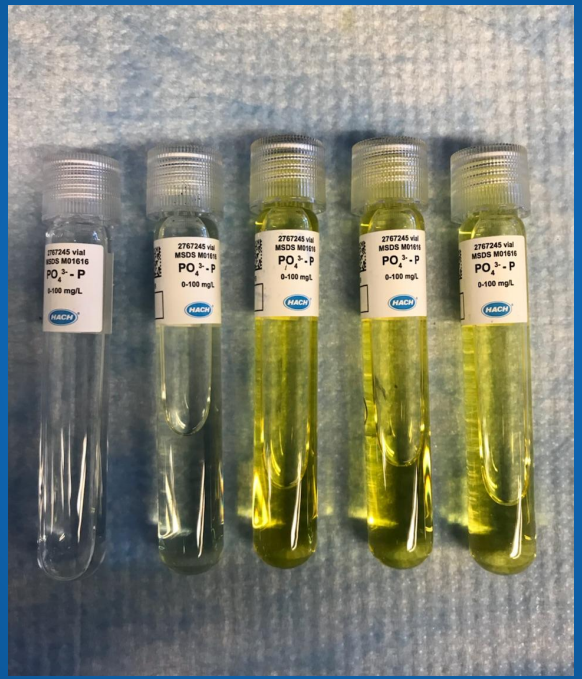

Figure 5: Orthophosphate testing. Photo courtesy of Alex Anzar.

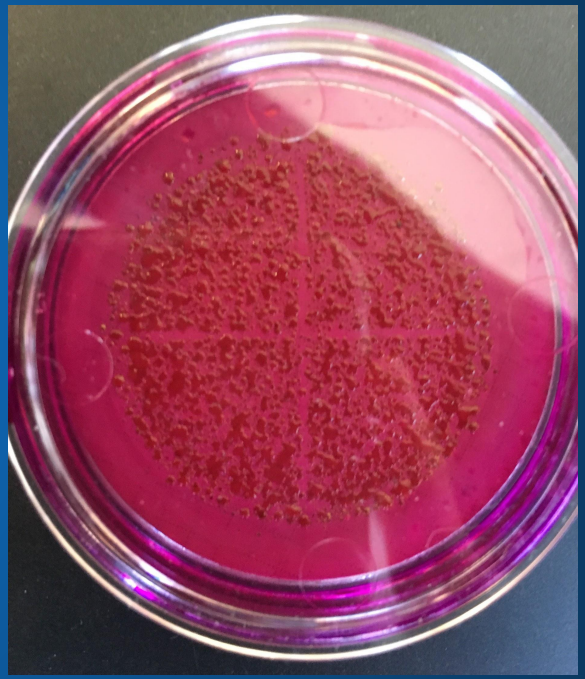

Figure 6: Coliform testing results. Photo courtesy of Shelby Carawan.

Work Completed: Finalizing Design

1. Sedimentation
2. Zeolite and sand filter
3. Ion-exchange resin
4. Granular activated carbon
5. Collection bucket

Note: T-shirt layers will cover the tops and bottoms of the buckets

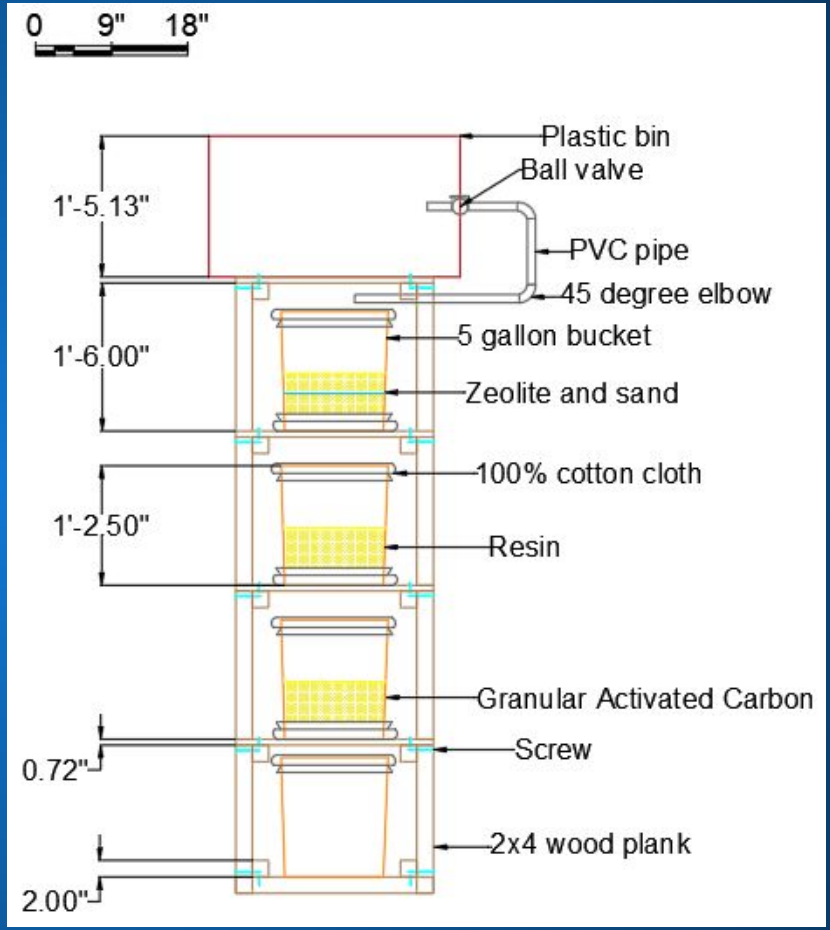

Figure 7: System flow diagram

Work Completed: Fabrication

- Sedimentation Bin
  - Nine minute settling time
  - Very little clay sedimentation
  - Need to increase bin's surface area and add microfilters

Figure 8: Sedimentation at t=0. Photo courtesy of Shelby Carawan.

Figure 9: Sedimentation after t=9. Photo courtesy of Paige Reilly.

Work Completed: Fabrication

- Constructed system frame and labeled parts
- Drilled holes in plywood bases & buckets
- Need to obtain materials for design modification

Figure 10: System frame. Photo courtesy of Alex Anzar.

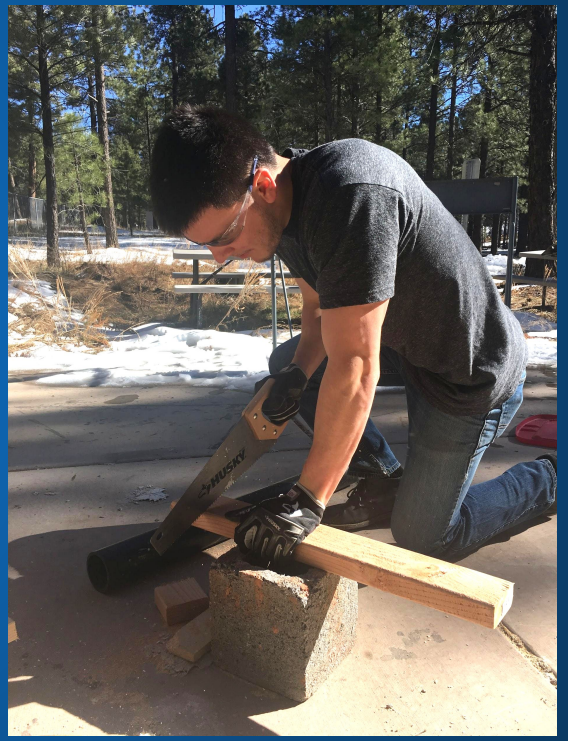

Figure 11: Construction Day. Photo courtesy of Paige Reilly.

Work Completed: Fabrication

Figure 12: Holes in plywood base. Photo courtesy of Paige Reilly.

Figure 13: Constructed System. Photo courtesy of Alex Anzar.

Figure 14: Labeled Parts. Photo courtesy of Paige Reilly.

Work Completed: PSWC Rules

- Contacted ASU PSWC Committee
- Change grading scale to ranked system

Table 3: Water Quality Scoring

Parameters	*Average Performance*		*Above Average Performance*	
	Level	Points	Level	Points
Total P-PO_4^{3-}	1 - 2 mg/L	8	≤ 1 mg/L	20
Total N-NO_3^-	10 - 20 mg/L	8	≤ 10 mg/L	20
Turbidity	1 - 5 NTU	8	≤ 1 NTU	15
Chlorine	N/A		4 ± 1 ppm	15
Total coliforms	N/A		≤ 5%	15
Odor	N/A		PASS	15

References

[1] American Society of Civil Engineers Environmental Design Competition. (2017). Flagstaff: Northern Arizona University, pp.1-9.

[2] “WHO | Environment and health in developing countries,” *Who.int*, 2017. [Online]. Available: http://www.who.int/heli/risks/ehindevcoun/en/. [Accessed: 17- Oct- 2017].

[3] M. Estrada, C. Mills and C. Mills, "New species of microscopic tardigrade discovered in a Japanese parking lot", BGR, 2018. [Online]. Available: http://bgr.com/2018/03/02/tardigrade-species-japan-parking-lot/. [Accessed: 04- Mar- 2018].

Questions

[3]