

American Society of Civil Engineers Environmental Design Competition



CENE 486C - Status Update #4
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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 accommodate the needs of communities in developing countries [2].



*Figure 1: 2017 PSWC Environmental Competition in Irvine, CA
(Photo courtesy of Celine Bannourah)²*

Project Summary

Table 1: Contaminant Quantities in 34L Simulated Water Sample

Contaminant	Amount Per 34L Water
Miracle Gro All Purpose Plant Food	1000g
Bulk Apothecary Kaolin Clay	1000g
Star Kay White Pure Lavender Extract	30mL
Wastewater Treatment Plant Secondary Clarifier Effluent	20mL

Competition Parameters: Total phosphorus as orthophosphate, Total nitrogen as nitrate, Turbidity, Coliforms, and Odor.

Schedule: Completed Tasks

Table 2: Completed Tasks for the March 6th to April 3rd Period

Task	Original Start Date	Original End Date	Actual Start Date	Actual End Date
Task 7: Finalize Design				
7.1 Component Integration	01/19/18	03/11/18	01/19/18	02/18/18
7.2 Optimization	02/18/18	03/11/18	02/18/18	03/15/18
7.3 Water Quality Testing	02/18/18	03/11/18	03/09/18	03/15/18
Task 8: 60% Report				
8.0 60% Report	03/14/18	03/28/18	03/09/18	03/28/18

Schedule: In-Progress Tasks

Table 3: In-Progress Tasks as of April 3rd

Task	Original Start Date	Original End Date	Actual Start Date	Actual End Date
Task 9: Pacific Southwest Conference Requirements				
9.1 Construction	03/12/18	04/09/18	02/18/18	04/06/18
9.2 Poster Presentation	03/12/18	04/09/18	03/30/18	04/06/18
9.3 Technical Presentation	03/12/18	04/09/18	03/30/18	04/06/18

Schedule: To Be Completed Tasks

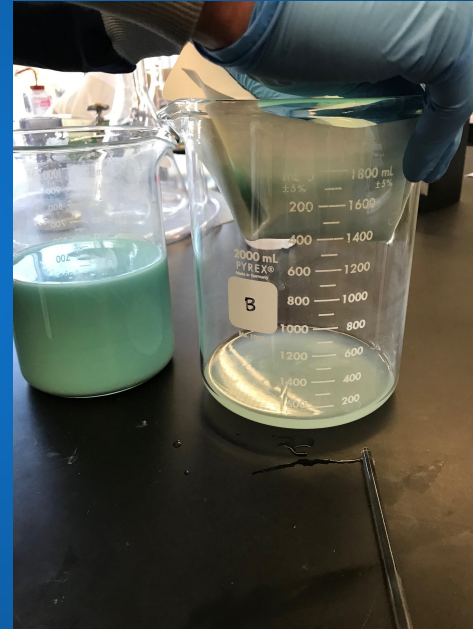
Table 4: To Be Completed Tasks for the April 3rd to April 24th Period

Task	Original Start Date	Original End Date	Actual Start Date	Actual End Date
Task 10: Capstone Deliverables				
10.1 Website	04/12/18	05/01/18	04/17/18	04/24/18
10.2 Final Presentation	04/12/18	05/01/18	04/17/18	04/24/18
10.3 Final Design Report	04/12/18	05/01/18	04/17/18	04/24/18

Work Completed: Microfilter Testing



*Figure 2: Microfilter Testing
(Photo courtesy of Paige Reilly)*



*Figure 3: Clogged Microfilter
(Photo courtesy of Shelby Carawan)*

Work Completed: Fabrication



Figure 4: Considered Alternative of Resin-Filled PVC Pipe (Photo courtesy of Paige Reilly)



Figure 5: Rough Draft of Chosen Design (Photo courtesy of Shelby Carawan)

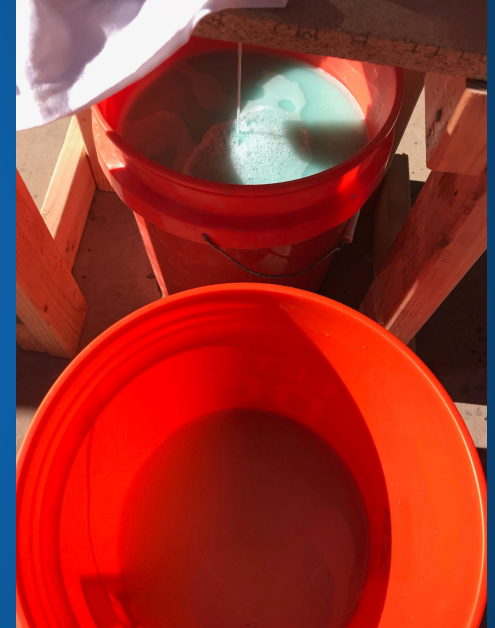


Figure 6: Raw Sample Versus Treated Water (Photo courtesy of Shelby Carawan)

Work Completed: Final Design

1. Sedimentation
2. Manual transfer
3. Sand filter
4. Ion-exchange resin
5. Granular activated carbon
6. Collection bucket

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

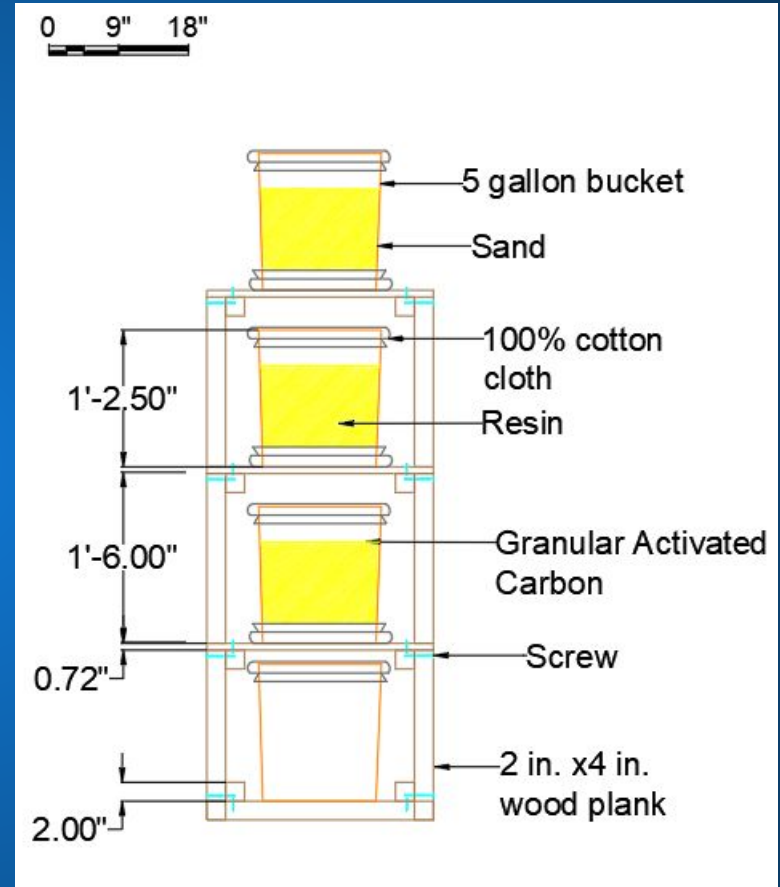


Figure 1: AutoCAD Rendition of Final Design

Final Design Water Quality

Table 5: Raw Versus Treated Water Quality Comparisons

Parameter	Units	WHO Standard	Raw Water Result	Final Water Result	Percent Eliminated
P-PO ₄ ³⁻	mg/L	1	3,390	200	94%
N-NO ₃ ⁻	mg/L	10	50	2.1	96%
Turbidity	NTU	1	1,000	190	81%
Total Coliforms	Unitless	≤ 5%	Present	Not present	100%
Odor	Unitless	N/A	Present	Present	0%

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/ehindevco/un/en/>. [Accessed: 17- Oct- 2017].

