

Environmental  
Project  
Wastewater  
Filtration :)

# Overview

- X MidPac Procedure
- X Chemical treatment
- X Physical treatment
- X Announcements





# MidPac

- x Typical Procedure:
  - x Receive a list of constituents
  - x Design and test run filter!
- x During the event:
  - x Add chemical treatment
  - x Build physical structure
  - x Build filter during the time limit
  - x Make the cleanest water
- x Meet new people
- x Have Fun!



# Our Constituents!

Per 5-gallon bucket (2):

- x 4.5 Gallons of tap water
- x 8.0 oz of Folgers Classic Roast Ground Coffee
- x  $\frac{1}{4}$  cup of Gatorade Thirst Quencher Fruit Punch Powder
- x 5.5 oz Campbell's Tomato Juice
- x 1 18.4 oz box of Betty Crocker Milk Chocolate Brownie Mix
- x 3-cups Quaker Quick 1-minute Oats





# Goals for our Design

- x Cost effective
- X Easy to construct!
- x Feasible
- X Sustainable
- X Provides good water quality

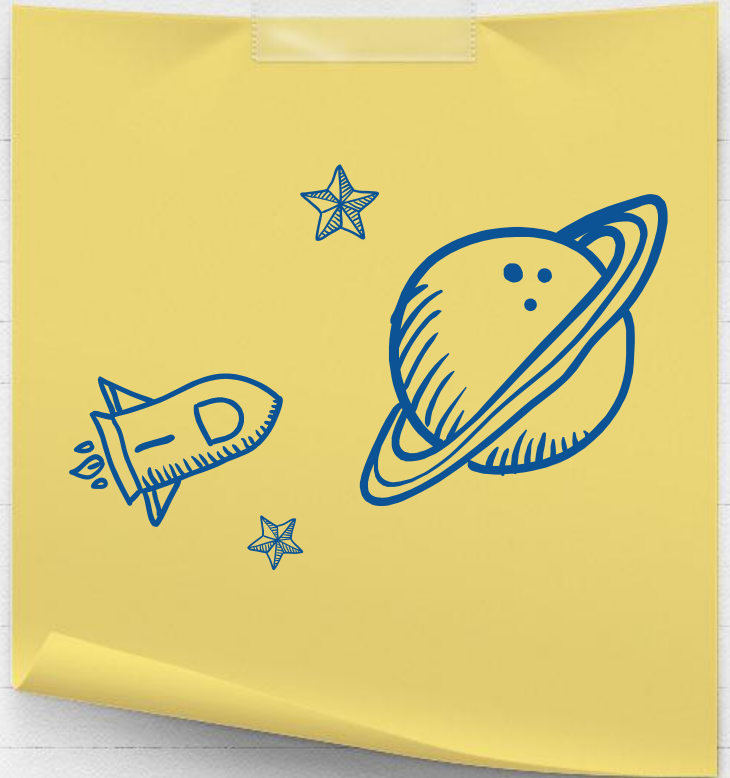


# Chemical Treatment

Pretreatment Process!

# Parameters We Measure!

- x pH
- x Turbidity
- x Electrical Conductivity (EC)
- x Dissolved Oxygen (DO)
- x Volume





# pH

- x **What does pH tell us?**
  - x Measures how acidic ( $\text{pH} < 7$ ) and basic ( $\text{pH} > 7$ ) the water is!
- x **What do we used to measure pH?**
  - x pH probe on an Ultrameter III 9PKT
  - x litmus tests
- x **What causes pH?**
  - x Acids and bases!
  - x ex. Lemon juice or soap





# Electrical Conductivity

## x What does EC tell us?

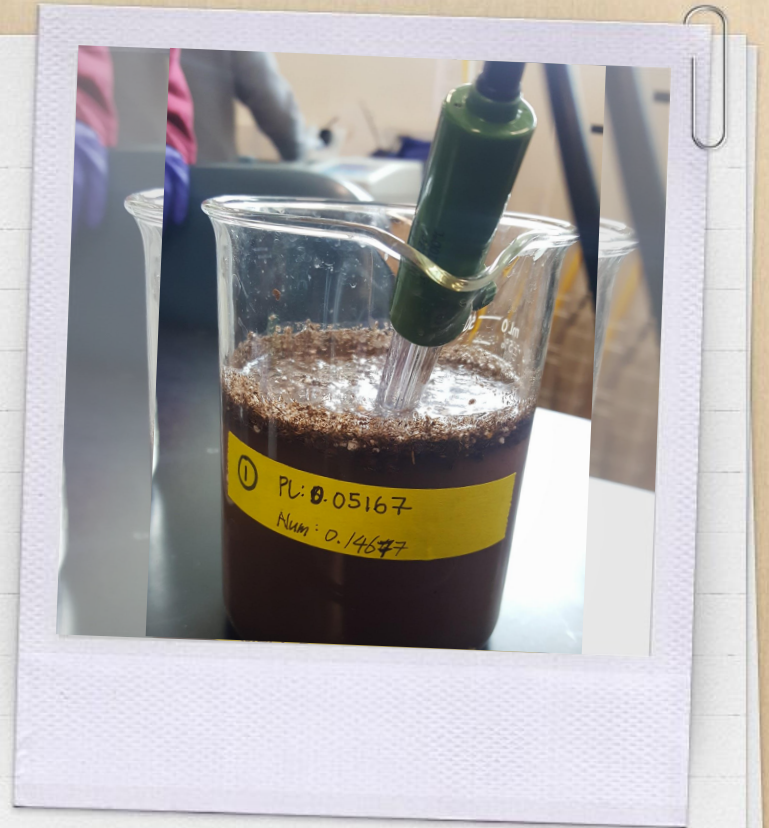
- x Measures ion mobility in the water. EC is proportional to the concentration of conductive ions in the water

## x What do we used to measure EC?

- x The EC probe on an Ultrameter III 9PKT

## x What causes EC?

- x Cations and anions! salts.



# Turbidity

- x **What does turbidity tell us?**
  - X Measures the cloudiness or haziness of our water!
- x **What do we used to measure turbidity?**
  - X HACH 2100AN Turbidimeter
- x **What causes turbidity?**
  - X Large amounts of tiny suspended particles that scatter light!
  - X ex. From clay





# Dissolved Oxygen (DO)

## x What does DO tell us?

- x The amount of oxygen that is dissolved in the water
- X Important for living organism!

## x What do we used to measure DO?

- x YSI 5100
- x HACH DO Test Kit

## x What causes DO?

- x Aeration through the physical treatment process (ex. holes)





# Overall Goals for Our Wastewater

Parameters	Goal
pH	Between 7.0-7.5
Turbidity (NTU)	Below 15 NTU
Electrical Conductivity ( $\mu\text{S}/\text{cm}$ )	As low as possible
Dissolved Oxygen (%)	100
Volume (gallon)	9

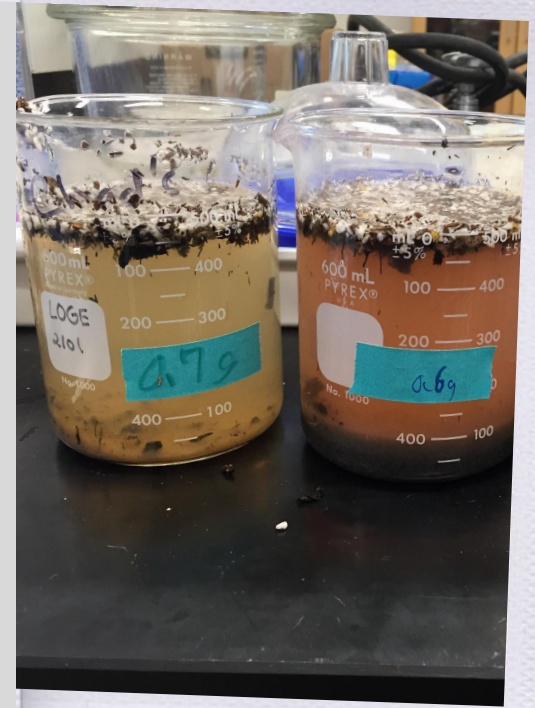
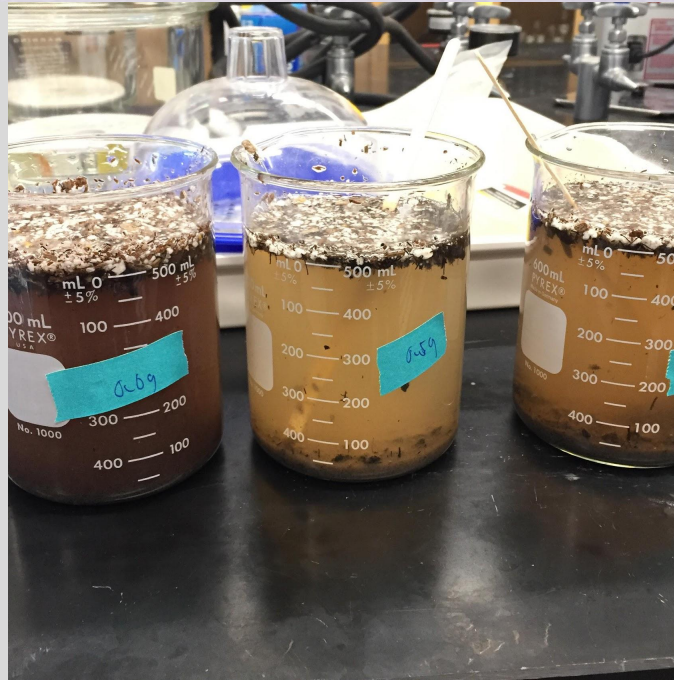


# How Parameters were Lowered in Previous Years

- x **Pickling lime and Alum!**
- x **Why?**
  - x Low in costs
  - x Lowers Turbidity and pH (will go more into depth in future meetings)
  - x Wildy used in treatment plants







We will find the best combination to make the cleanest water!



# Physical Treatment

Process!

## Overview

- X Material Considerations
- X Filter Design Analysis
- X Primary Physical Treatment
- X Secondary Physical Treatment



# Material Considerations

## Things to keep in mind

- Cost
- Safety
- Efficiency

## Examples from last year

- Cotton balls caused clogging issues
- Using scissors to achieve a multitude of tasks, saving us construction time





# Material Considerations

Table 3.1.1. Overall materials used and cost associated

<b>Material</b>	<b>Unit</b>	<b>Cost Per Unit</b>	<b>Total Cost</b>
5 Gallon Bucket	2 units	\$3.00	\$6.00
30 Gallon Tote	1 unit	\$12.00	\$12.00
Stainless Steel Safety Wire	1 lb	\$3.00	\$3.00
Terry Cloth Rag	1 lb	\$2.50	\$2.50
Pumice Stones	1 ft <sup>3</sup>	\$3.00	\$3.00
Commercial Grade Sand	1 lb	\$0.15	\$0.15
Paper Towels	1 unit	\$1.50	\$1.50
Total			\$28.15

# Filter Design Analysis

## Things to keep in mind

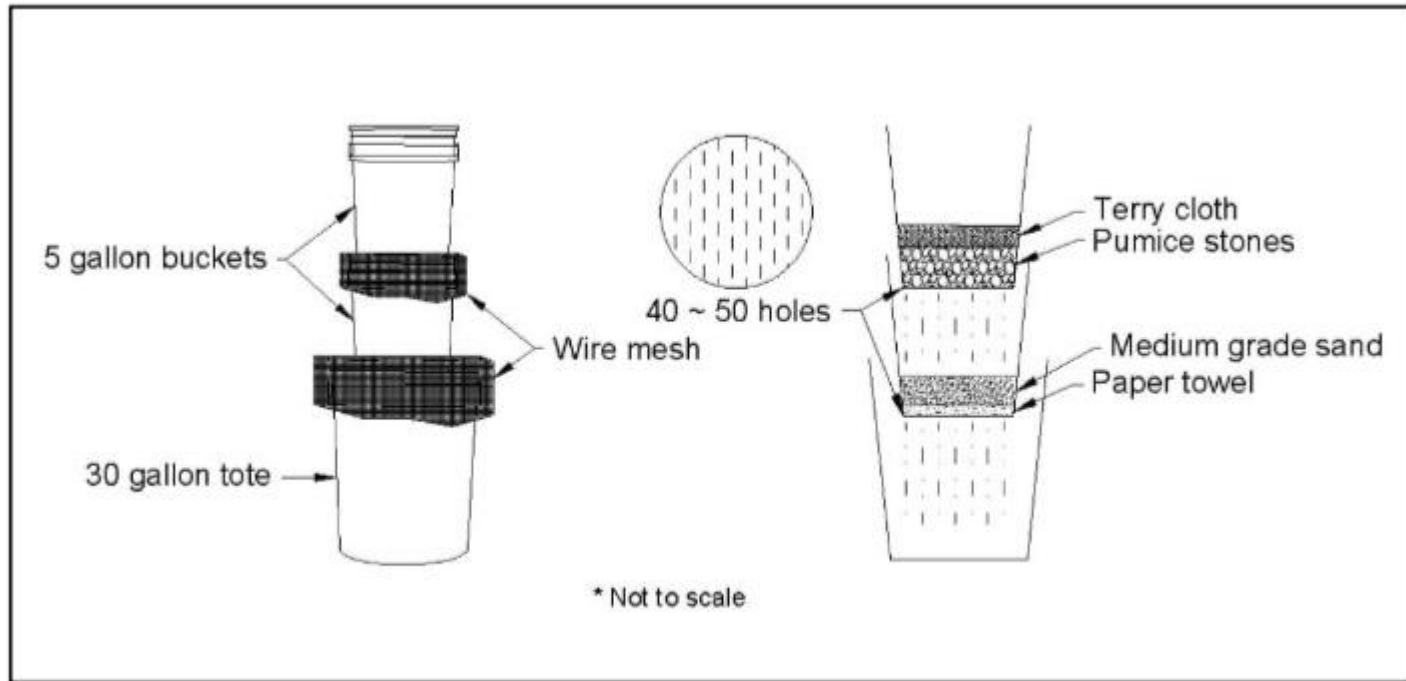
- What size of our filter do we want to have?
- Will the size help with the rate of flow and produce cleaner water?
- What kind of product would we like to use as the main structure of our design? (ex. bucket)
- How do we want to layer our filter? (small items on top, bigger items on the bottom)



# Filter Design Analysis



# Filter Design Analysis





# Primary Physical Treatment

- Refers to the physical removal of solids from the wastewater.
- Referring from last years design, 2 buckets were stacked on top of each other. First bucket focused on the removal of solids and large particles. Second bucket focused on removing any small left over particles from the first bucket.

## Secondary Physical Treatment

- Refers to the removal of the left over smaller solids from the first removal from the Primary Physical Treatment.
- Referring from last years design, the role of the second bucket focused more on removing any small left over particles from the first bucket.



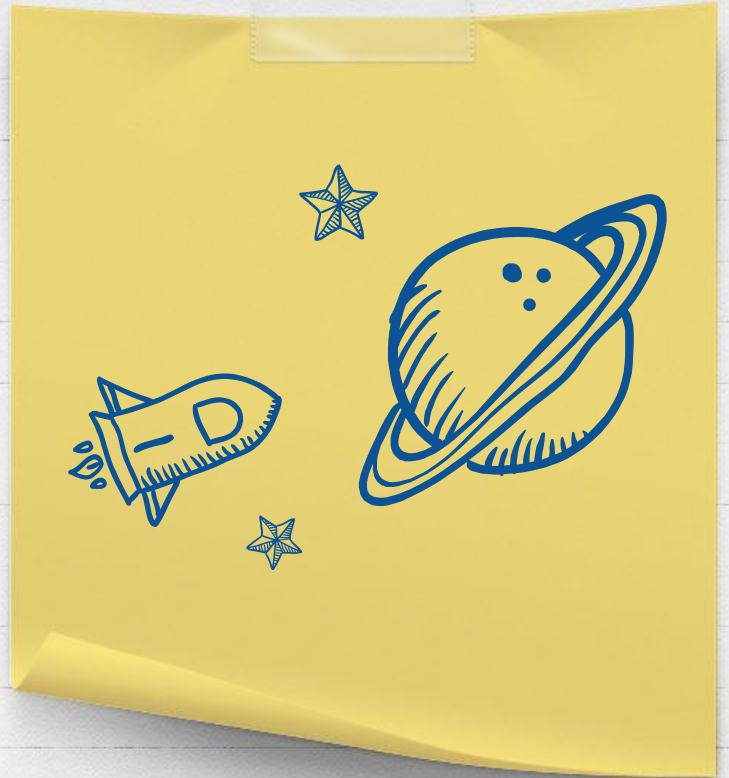
# Things to record throughout the Design Process

- Record our trials and errors
- Which Materials worked best
- Which structure design was more successful
- What can we improve on?

# Breakout Rooms!

Random Mix: Brownie mix, tomato  
juice, coffee!

How would you filter this out?



# Announcements

- x We will be sending out a survey to get a better understanding about who is interested in what team!
- x Our first social will be next Saturday! **November 14th 4PM PST!**
- x If you haven't already please fill out the google form for the social!





# Thanks!

## Any questions?

- x Follow us on IG:  
@environmentalproject.ucd
- x PLEASE PLEASE please. Pls. Visit  
our website:  
[https://ucdenvironmentalproject.  
weebly.com/](https://ucdenvironmentalproject.weebly.com/)

