

Tan Yuan Wei Joshua Mei Zhiwei
 Ma Han Ni Tun Kee Zhiyun
DUNMAN HIGH SCHOOL

Initial properties of natural reservoir water

Concentration of Pb before treatment: 70.4217 ppm
 Concentration of Cu before treatment: 56.9025 ppm
 Temperature: 27 degree Celsius
 pH: 6.8



Width
 6.5cm
 diameter

Height
 4.0cm



Stage 1: Sand Filter

Physical filtration

To effectively filter the contaminants from the water, we have adapted the sand filter to one that has a gradient from large stones, pebbles to fine sand. The gradient of the sand filter ensures the systematic removal of particles according to size. The sand layers act as particle sieve to remove much of the larger sediments and particles.

Biological filtration

Fine sand helps to remove larger organisms and microorganisms in the range of 0.5 – 2.0 cm, majority of them are water planktons [hydra (~2.0 cm), oligochaetes (1.5 mm - >2.0cm), leeches (>1.0cm)] and arthropods, especially mosquito larvae (< 8 mm).

Stage 2: Gauze & Coffee Filter

Physical filtration

This layer helps to hold the sand filter in place as well as trap the finer sand particles and prevent them from flowing through to the next stage of the column and pollute the water

Stage 3: Tea Leaves & Charcoal

Chemical adsorption

After the spiked samples were run through our whole filtration system which consists of sand filter, mixture of green tea and red tea with charcoal, there was a percentage removal of Pb and Cu of **58.68%** and **70.41%**, respectively. Our raw samples contained 0.6868 ppm of Pb and 0.0290 ppm of Cu. Translating the percentage removal of Pb and Cu into absolute terms, it could mean that the Pb and Cu levels in our raw samples will be reduced to 0.2838 ppm and 0.008581 ppm, respectively.

Stage 4: Gauze & Coffee Filter

Physical filtration

This layer helps to hold the pounded charcoal and tea leaves in place as well as prevent the fine charcoal particles from flowing through, so that the water will not contain charcoal particles

Final properties of natural reservoir water

Concentration of Pb before treatment: 29.0964 ppm
 Percentage removal of Pb: 58.68%
 Concentration of Cu before treatment: 16.8396 ppm
 Percentage removal of Cu: 70.41%

Time spent in the filter column

20 minutes