

StaRS Backwash

Stacked Rapid Sand Filtration Backwash Fall 2014

The goal of StaRS Backwash is to determine the sand grain sizes and distribution for the most efficient and effective backwash in the stacked rapid sand filters. The proper amount of fluidization must be determined for efficient backwash. A expansion ratio of 1.5 is the current standard for the sand bed during fluidization. A sand size ratio below 1.5 is suggested for minimal segregation during backwash. AguaClara plants currently use a backwash velocity of 11 mm/s, so we used this experimental backwash velocity as the reference velocity. Different sand grain sizes were tested in a small scale sand filter for proper fluidization and efficient backwashing.

An experimental apparatus was designed and fabricated consisting of a 4 ft long 2 inch diameter clear PVC pipe connected to the tap as the water source. The PVC pipe acts as a filter column with wire mesh on the bottom to keep sand inside and a removable cap on top to allow the team to change sand bed heights and sand sizes. The figure below is the experimental setup:



Sand segregation tests were performed on standard sieve sand sizes 20-30 and 30-40. The segregation was tested by using two different colored sand of different sizes. By testing these two sand size ranges at different velocities, the team was able to come to a few conclusions: 1) segregation will always occur with sand sizes 20-30 because the sand size ratio is too large 2) segregation does not occur in sand sizes 30-40 below a threshold backwash velocity, determined to be around 15 mm/s. These conclusions suggest that AguaClara sand filters would have less segregation problems during backwash if they switched to sand sizes 30-40 (instead of the current 20-30) and if the backwash velocity is below 15 mm/s (which is true of the current 11 mm/s backwash velocity).

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Documents

	Challenges	Tasks	Symposium	Final Presentation	Final Report
Fall 2014	? Unknown Attachment	? Unknown Attachment			? Unknown Attachment