

# Enhanced Removal of Pathogens in Stormwater through Filtration with Iron-Amended Media

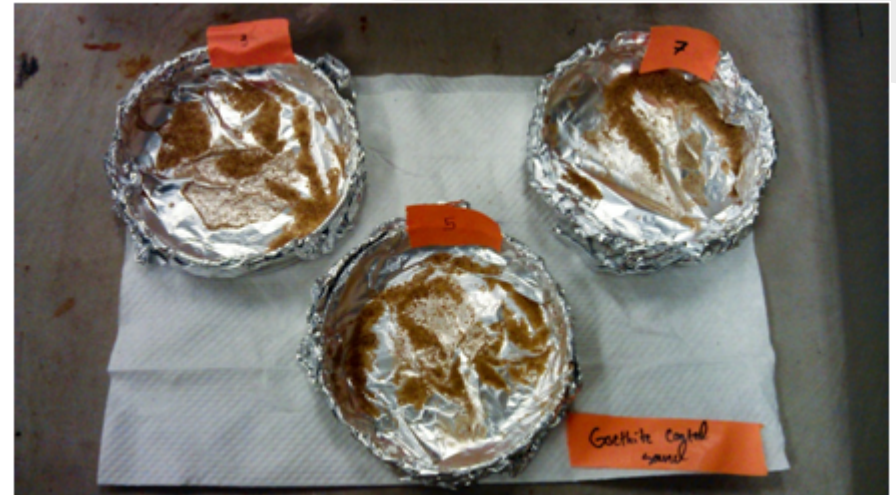
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**Scope:** Stormwater runoff pollutes “an estimated 13% of river segments, 18% of lakes, and 32% of estuaries surveyed” (US EPA, 2009)

Contaminants of concern include fecal indicator bacteria (FIB) such as total coliforms, fecal coliforms, and *Escherichia coli* (*E. coli*) and *Enterococcus faecalis* (*E. faecalis*)

**Background:** Most bacteria and viruses exhibit a negative charge under neutral pH while iron oxides exhibit a positive charge.

- Addition of positively charged media to bioretention basins may improve pathogen removal.



**Figure. 1:** Goethite coated sands of varying pH

**Objective 1:** Design and prototype an improved system for column testing of positively charged media.

**Objective 2:** Compare different types of iron-coated sands (ferrihydrite and goethite of varying pH) and their effect on pathogen removal through batch tests (Fig. 1).



## Objective 1

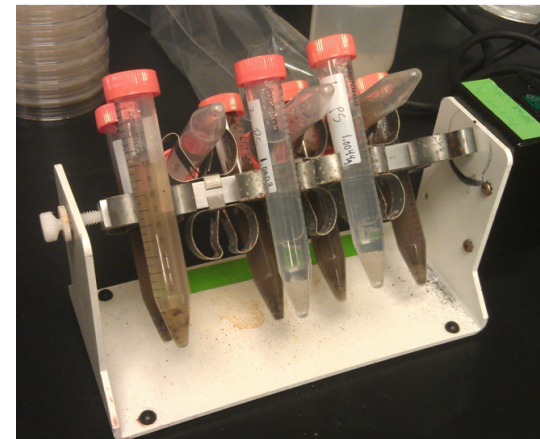
- Designed and built a prototype column for long term experiments examining the influence of microbial communities on removal
- Materials used: PVC pipes, unions and globe valves (Fig. 2)
- Original cost: \$17
- New cost: \$12.67
- Savings: >\$170



**Figure 2:** First design iteration of column

## Objective 2

- Grew two day old *E. coli* and prepared MS2 sample
- Prepared agar plates for virus plaque counts
- Ran a one-hour batch test of ferrihydrite, goethite (pH: 3, 5, 7), plain sand and zero valent iron (new and old samples), NaCl blank (Fig. 3)
- Requires further study



**Figure 3:** Batch test