

Dual Media BioSand Filter

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Background

Vietnam has a dense river network consisting of 2,372 rivers and over 600,000 square miles of watershed basins with most of these basins densely populated with floating houses (Whitney). Due to the recent socio-economic development, the rise in population, and the lack of government environmental regulations the quality of river water has drastically declined. The water is down river from urban and industrial areas and contains high concentrations of organic matter, viruses, bacteria, fertilizers, and pesticides. When considering pesticides and other uncommon substances it becomes apparent that typical water purification methods will not be an effective solution to treat the polluted water. The polluted water leads to diseases and if left untreated can lead to Gastro Intestinal infection, birth defects, and ultimately mortality. According to the World Health Organization, “1.4 million children in the world die every year from diarrhea caused by unclean water and poor sanitation – this equates to 4,000 child deaths a day or one child every 20 seconds” (WHO). It is evident that an affordable method to provide clean water is necessary.

Design/Method

To simulate the water of the Vietnam Rivers, waste water from the aeration basin at Lower Poplar Waste Water Treatment Plant was used. The influent from the aeration basin has similar characteristics, such as BOD₅ and COD levels, to the major Vietnamese rivers. In order to imitate the pesticide concentration found in these rivers, p-nitrophenol, a component commonly found in pesticides, was diluted into the wastewater sample at a high concentration. A total of seven test analyses were performed on the influent and effluent side of each filter. COD, Coliform, Absorbance, Turbidity, Flow rate, pH, and Solids Test were conducted in order to test the performance of each filter.

Results

Both biosand filters, met the criteria set forth by EPA regulations. The criteria used are as followed:

- 95% Coliform removal
- 75% pesticide removal
- Turbidity less than 5 NTU
- Total solids concentration less than 500 mg/L

Based on results and analysis, both filters performed similarly, however due to a higher percentage of coliform removal the GAC before the biosand filter was chosen as the better alternative.