

Research on the discharge load reduction of combined sewer overflows by high-rate fabric filtration

Whole term

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(Purpose)

The adverse effects on the public water quality caused by receiving untreated sewage discharges during the rainy period are of great concern. For the completion of the combined sewer system, the extension of the collector sewer, and underlying pipes for storage and retention basins are promoted. However, it would require a high cost and long construction period due to their large scale. Therefore, simplified and immediately-effective method is needed.

The characteristics of the technology that adopts the up-flow filtration type using buoyant fabric media are the high filtration rate of 1,000~2,000 m/day, small land-use and easy maintenance with no chemical use. Thus, it was easy to be applied to the existing treatment plant and this process dealt with the primary treated wastewater in case of rain or secondary treated wastewater for fine weather resulting in a discharge load reduction of the combined sewer system.

This research performed experiments in 2 treatment plants aiming at evaluating the treatment-performance, summarizing the maintenance and design resources for utilization and publishing the technological report.

(Results)

1. Basic evaluation by column experiments

Suitable medium for filtration of the primary treated wastewater in case of rain and secondary treated wastewater for fine weather was selected by small-scale column experiments. Also, the basic conditions of filtration speed (2,000 m/day in case of rain and 1,000 m/day for fine weather) and final pressure loss of the filter (10~30 kPa) were determined.

2. Evaluation of the filtering performance by experiments

SS removal rate was 50~70 % for the primary treated wastewater in case of rain and about 70% for the secondary treated wastewater for fine weather confirming its stable treatment-performance. However, BOD removal rate was low due to the fact that BOD removal resulted from SS removal.

3. Evaluation of the durability of the medium

The experiments for evaluating the abrasion and heat of the medium showed that the medium needs to be supplemented by 2% per year. Also, the investigation of the influence on the filtering efficiency due to the variation of washing showed that media would have to be replaced after 5,000 times of washing.

4. Annual reduction of the discharge load

The effect on the annual reduction of the discharge load was calculated for the case that this technology would be applied to the treatment plant of combined sewer system based on the virtual treatment model of "Tentative guideline of countermeasures for combined sewer overflows(1983 edition)." The results of the simulation showed that approximately 60% of SS load could possibly be reduced.

5. Technical report

The technical data on the range of application, design, planning, evaluation of the performance, maintenance and etc. for quick fabric filtration were summarized.

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Keywords

Improvement of combined sewer overflows, Primary treatment, High-rate fabric filtration