Research on Performance Evaluation of High-Rate Filtering Facility in Shibaura Water Reclamation Center

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(Purpose)

Bureau of Sewerage Tokyo Metropolitan Government and JIWET(Japan Institute of Wastewater Engineering Technology) started the research for putting a high-rate filtering technology into practical use in 1993. We planned to make the high- rate filtering technology which was the target of research have not only a function as an alternative facility of a primary sedimentation tank but also a function for advanced primary treatment when it rains. Thus, we checked the performance of the filtering facility when it was fine and when it rained in a pilot plant, and made a research report. On the basis of the results of this research, an actual facility was constructed in the Shibaura Water Reclamation Center and has been operated since 2002.

(Results)

We decided to carry out performance evaluation when it is fine and when it rains based on the results obtained under the same conditions as those for the practical implementation research. Data for performance evaluation is represented by the following expression as shown in Fig. 1 when the amount of SS capture is (S) as shown in Fig. 1. The relationship between accumulated flow rate and accumulated amount of captured SS within backwashing intervals is shown in Fig. 2.

$dS(t)/dt = Cin(t)\cdot Q(t) - Cout(t)\cdot Q(t)$

Cin :Raw water SS concentration

Cout :Treated water SS concentration

Q :Flow rate of filtered water

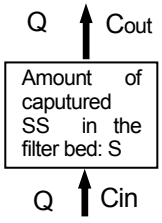

Fig.1 Amount of captured SS in the Filer Bed

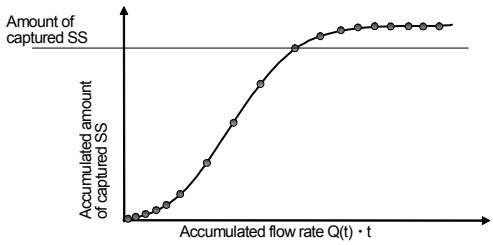

Fig.2 Conceptual Diagram of Accumulated Amount of Captured SS

We used an interval in which the accumulated amount of captured SS reaches 4.8 kg／filtering material m^3 when it is fine, and in which the accumulated amount of captured SS reaches 10 kg／filtering material m^3 when it rains as a performance evaluation target range based on the relationship between the accumulated flow rate after back washing and the accumulated amount of captured SS.

(1) SS removal performance (when it is fine)

We confirmed that the SS concentration of raw water was 100 to 200 mg／ℓ and when the SS concentration of raw water became low, the SS removal rate lowered a little, but in the vicinity of presumed concentration of 200 mg／ℓ the removal performance was almost the same as 60% which was a target SS removal rate.

(2) BOD removal performance (when it is fine)

We confirmed that the BOD concentration of raw water was in a range of 100 to 250 mg／ℓ and when the BOD concentration of raw water became low, the BOD removal rate tended to lower a little, but the removal performance was almost the same as 30 to 40% which was a target BOD removal rate.

(3) SS removal performance (when it rains)

We confirmed that the SS concentration of raw water was in a wide range of 100 to 600 mg／ℓ, but in the vicinity of 200 mg／ℓ which was presumed concentration during the practical implementation research, the removal performance was about 70% which was a target SS removal rate.

(4) BOD removal performance (when it rains)

We confirmed that the BOD concentration of raw water was in a wide range of 100 to 600 mg／ℓ, but in the vicinity of 200 mg／ℓ which was presumed concentration during the practical implementation research, the removal performance was 50 to 70% which was a target BOD removal rate.

Since this high-rate filtration process is a new technology using a new-generation sewerage support system, we distributed a performance evaluation report to a large number of local autonomous bodies.

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