

## Research on the high-speed fiber filtration with chemical precipitation for improving a combined sewerage system

Whole term

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### (Purpose)

Some technologies for improving a combined sewerage system were developed in Sewage Project, Integrated and Revolutionary Technology for 21<sup>st</sup> Century (SPIRIT21) during the three years from 2002 until 2004. As an outcome from the project, the development disclosed in the article of “Super-High-Speed Fiber Filtration for Untreated Combined Sewage Water Overflow on Rainy Days” (referred to Prior Technology, hereinafter) was assessed and accredited as a technology for removing pollutants such as SS and BOD, where the settling operation without chemical addition as a pretreatment was incorporated in the filtration process. In contrast, as of Apr. 1, 2004, the cabinet order to revise partly the Sewerage Regulations Enforcement Order was put into effect, where the BOD concentration was specified to be at 40 mg/l or less with respect to each processing region in case that stormwater gives significant effect on final effluent from a combined sewerage system. It is envisioned, however, that an excessively high BOD removal efficiency, which cannot be established without chemical additions to the water, may be required in a processing region subject to the enforcement order to meet the quality standards to be applied to the water discharged from a combined sewerage system on rainy days.

This research aims to improve the BOD removal efficiency further, with respect to the Prior Technology. As the procedure, first, coagulating reaction will be caused using polymeric flocculating agents prior to the settling as a pretreatment. Next, the technology for the high-speed fiber filtration with chemical precipitation will be assessed with performance targeting a practical application. Finally, technical issues, such as planning, designing, implementing, and maintenance and administration techniques, will be aggregated.

### (Results)

#### (1) Removal efficiencies of SS and BOD

Based on demonstration experiments, the processing performance of the resultant technology from this research was assessed, based on comparison of removal efficiencies of SS and BOD in this research with those in the conventional technology and the Prior Technology. The summary is shown in Table 1 below.

According to this technology, the removal efficiency is improved with higher chemical addition ratio. Using this technology, at the chemical addition ratio of 3 mg/l, the SS and BOD removal efficiencies were improved by 10 points and 15 points or more, respectively, from the Prior Technology.

Table 1 Comparison of removal efficiencies

Processing type	Conventional technology	Prior Technology	This technology			
	Stormwater settling tank	Settling + high-speed fiber filtration	Chemical precipitation + high-speed fiber filtration			
With or without chemical additions	Without chemical additions	Without chemical additions	Performance goal (with chemical additions)	Chemical addition ratio (results of the experiment)		
				2mg/l	3mg/l	4mg/l
SS removal efficiency (%)	30	70	80 or higher	91	92	94
BOD removal efficiency (%)	30	60	75 or higher	74	77	79

\* Settling time is 12 min for each Prior Technology and this technology.

#### (2) Chemical addition ON/OFF control

The chemical addition ON/OFF control, where turbidity changes are briefly captured using a turbidimeter and thereby ON/OFF of the chemical addition is automatically switched, enables economical operation through saving expenses for the chemicals. During the demonstration experiments, the effectiveness of this control was confirmed. (Fig. 1)

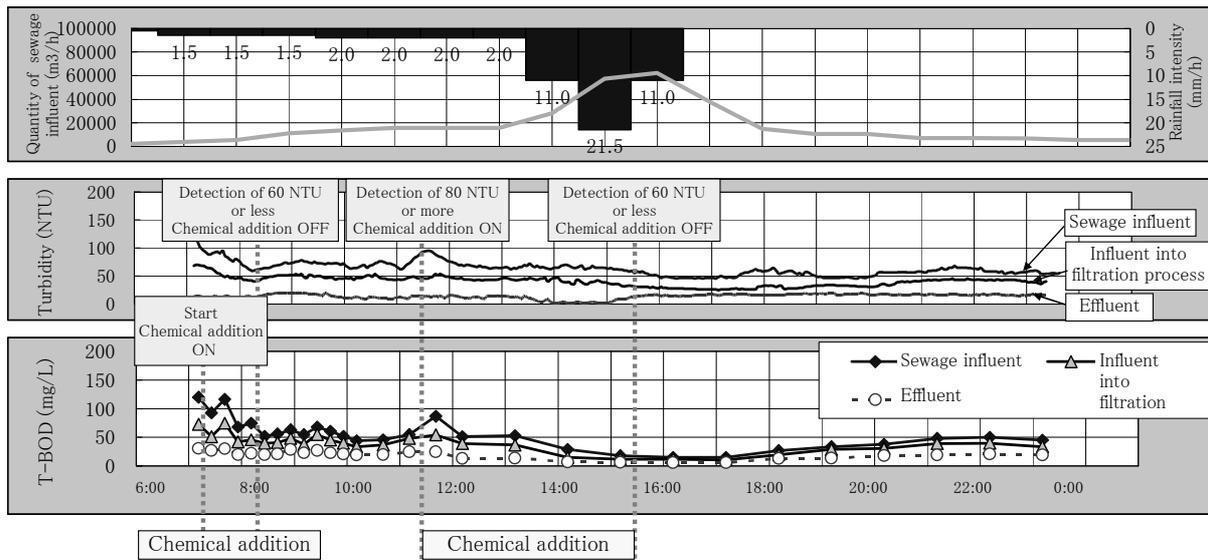


Fig. 1 Example of the chemical addition ON/OFF control during the demonstration experiments

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Key words

Improvement of a combined sewerage system, chemical precipitation, fiber filtration, improvement of the BOD removal efficiency