Research on the ability of liquid-solid separation of mixed liquor of the activated sludge process using a non-woven fabric		
Whole term	1999.7~2003.3	

(Purpose)

Secondary sedimentation of the activated sludge process is important in obtaining a sound water quality through liquid − solid separation, and it keeps MLSS at a given concentration. Gravity settling tank is on the basis of specific gravity difference of water and solids. On this account there are some problems.

- Very weak at variation of the flow rate and sludge elements.
- The MLSS concentration of the return sludge has to be lowered in order to prevent carry-over of suspended solids. Also, the water treatment plants located in cities have such limitation and consideration as mentioned below.
- Difficult to obtain new spaces in case that an enlargement or installation of an advanced treatment unit are required. So the occupied space by the unit has to be reduced.
- Advanced treatment is a must due to the fact that there are polluted water bodies in the urban areas. Especially, an effective solid-liquid separation is needed because of high concentration of MLSS with respect to the removal of nitrogen and phosphorus.
- In order to achieve an efficient solid-liquid separation and site reduction, a technology for the solid-liquid separation using a cost effective non -woven fabric with high filtration rate, was focused on. The object of this study was to estimate the practical usage of the separating technology by means of a pilot plant.

This study was progressed as a joint research with Tokyo Wastewater Treatment department and the Japan Institute of Wastewater Engineering Technology.

(Results)

In 1999 and 2000, the test was conducted in the Ochiai Treatment Plant. Since 2001, the test was conducted in the Sibaura Treatment Plant. The results were as follows:

1) Water quality and sludge ingredients

①Compared to the effluent of the secondary settling tank at the Sibaura treatment plant, suspended solid concentration was little higher and BOD was the same. However, it satisfied the targeted quality (BOD 15mg/L, SS 10mg/L).

②In this method, the turbidity and the CST-SS ratio were in the optimum range as the maximum turbidity of supernatant for SV_{30} was less than 20 NTU, and the CST-SS ratio was less than 2s·ℓ /g.

③In this method, the ranges of the filtration rate and the MLSS concentration were 3.5m/day and 4,000mg/L, respectively.

④At Ochiai and Nakagawa Treatment Plants, the sludge characteristics and flocculation were stable. Hence, it would be better to use this technology. However, sludge characteristics in the Sibaura Treatment Plant were not satisfied.

2) Membrane structure

① At Ochiai Treatment Plant, the membrane structure was a non-woven fabric with a screen of 18 meshes (1mm width) kept on the surface of the activated sludge to prevent the non -woven fabric being destroyed by aquatic living organisms like leech.

② At Sibaura Treatment Plant, there was no leech problem. And fouling seemed to have occurred on the screen due to fine activated sludge. Therefore, the surface of the non-woven fabric was treated by heat to make stable solid-liquid separation.

3) Cost

Even though the conventional activated sludge with this technology increased the cost, the cost

of A^2O remained approximately the same.

Collaborators: Bureau of Sewerage Tokyo Metropolitan Government

Personnel in charge of the study: Syuji Tanaka, Junji Suzuki, Yuta Ichimatsu

Keywords	Non-woven fabric, Membrane, Solid-liquid separation, Filtration