Demonstration of Flow Fluctuation Tracking Type Wastewater Treatment Using DHS System (B-DASH)

(Research for FY 2016-17)

1. Purpose

This study aims to demonstrate the performance of "Flow Fluctuation Tracking Type Wastewater Treatment Technology using DHS System" that is the combination of DHS (Down-flow Hanging Sponge) filter bed and a biological filtration tank. This new system enables the downsizing of treatment facilities to deal with the reduction of inflow volume caused by population decline.

The demonstration is adopted as B-DASH Project[*1] 2016 of MLIT[*2]. The consortium of Sanki Engineering Co., Ltd.; Tohoku University; National Institute of Technology, Kagawa College; National Institute of Technology, Kochi College; Japan Sewage Works Agency, and Susaki City conduct the demonstration as an entrusted research project of NILIM[*3].

*Wastewater treatment technology that is capable of downsizing should be able to:
① Reduce the treatment capacity meeting the reduction of inflow amount
② Reduce LCC following the reduction of inflow amount

*1.B-DASH Project: Breakthrough by Dynamic Approach in Sewage High Technology Project
*2.MLIT: Ministry of Land, Infrastructure, Transportation, and Tourism
*3.NILIM: National Institute for Land and Infrastructure Management

2. Progress in previous year

In 2016, researchers set up the demonstration facilities and started continuous operation during winter. They also established small demonstration equipment.

3. Achievements of this year

The demonstration facilities ran through the year to verify the treatment stability of the new technology including the reduction effects of the power consumption rate for wastewater treatment and sludge generation volume. The small demonstration equipment worked for investigating a permissible load and temperature of BOD, influences of layer height of DHS, and environmental effects of treated water from DHS filter bed.

(1) The result of the year-round operation demonstrates that treated wastewater of the new treatment technology satisfied the design effluent quality that BOD should be above 10mg/L below 15mg/L, specified in the sewerage law.

(2) The experiment at Susaki city WWTP demonstrates that the new technology decreased an electric power consumption rate for wastewater treatment by 72% when daily inflow was average (Figure 1).

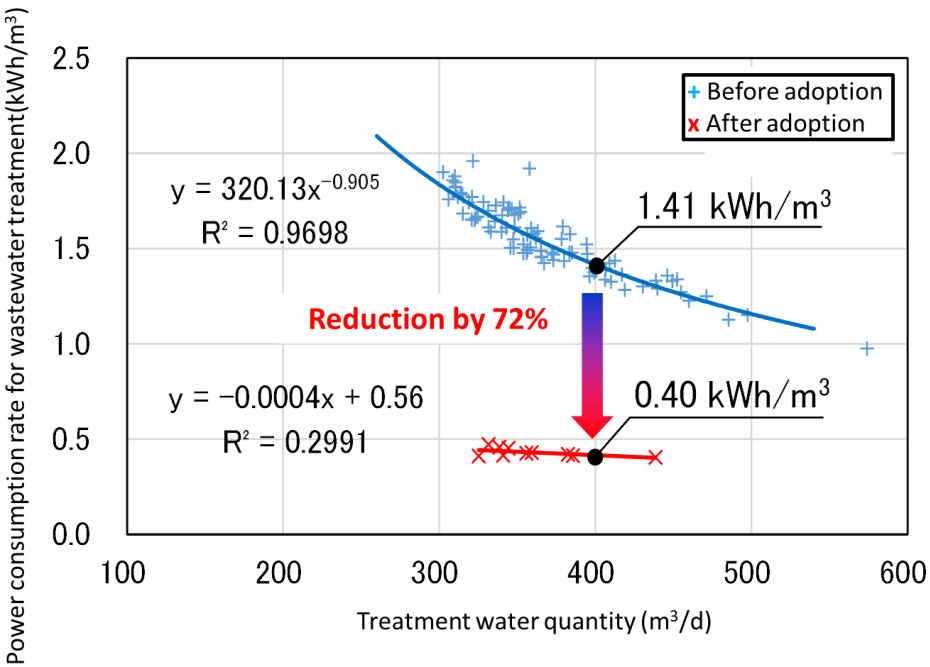

Figure 1: Treatment water quantity and power consumption rate

(3) The sludge generation rate of Susaki city WWTP was about 0.4. The rate of new technology was 0.2 by solids balance. After adopting the new technology, sludge generation rate decreased by 18%.

(4) The permissive load of the DHS system and the permissive water temperature were set as 0.9kg-BOD/(m^3·day) and 15℃, respectively based on the water quality of treated water from the DHS filter bed and biomembrane filtration facilities.

(5) There were no differences of T-BOD treated water quality and design volume load between three layers and four layers of the DHS carrier.

(6) It was figured that treated water from DHS filter bed needed no circulation because there was little effect of the circulation.

4. Future issues

The demonstration facilities continuously run based on the operation requirements gained this year. The researchers verify the stability of treated water and study the feasibility of downsizing like the effect of power consumption reduction with inflow decline.

Keywords: Downsizing, DHS filter bed, Moving-bed biological filtration, Energy-saving