Establishment of Implementation Procedures for Wastewater Treatment Performance Enhancement Technology

(Research of FY 2017-2021)

1. Purpose

Wastewater treatment facilities must flexibly cope with the treatment capacity shortage due to facility consolidation and elimination during a population decline.

This study deals with developing new technology and conducting a post-investigation for the alternative/enhanced water treatment processes, such as first sedimentation tanks, reaction tanks, final sedimentation tanks, and rapid filtration. It aims to further promote the use of these technologies by establishing a method to study their introduction during retrofit, etc.

2. Outcomes of This Year

(1) Demonstrations of treatment performance enhancement and alternative technologies

Through the B-DASH project (including independent research) or joint research, demonstrations on treatment performance enhancement or alternative technology at each phase of wastewater treatment processes were continued.

- High-rate filtration system as a substitute for a first settling tank (completed in 2020)
- Performance enhancement type wastewater treatment system (continued as joint research)

- Energy-saving wastewater treatment technology using high-efficiency solid-liquid separation and Dual DO control (completed as Independent research of the B-DASH project 2021)
- Treatment performance enhancement technology for a final settling tank (continued as Independent research of the B-DASH project)
- Disk-type multi-filament filter fabric filtration system (Completed as joint research in 2020 and selected as New Tech Implementation Program)

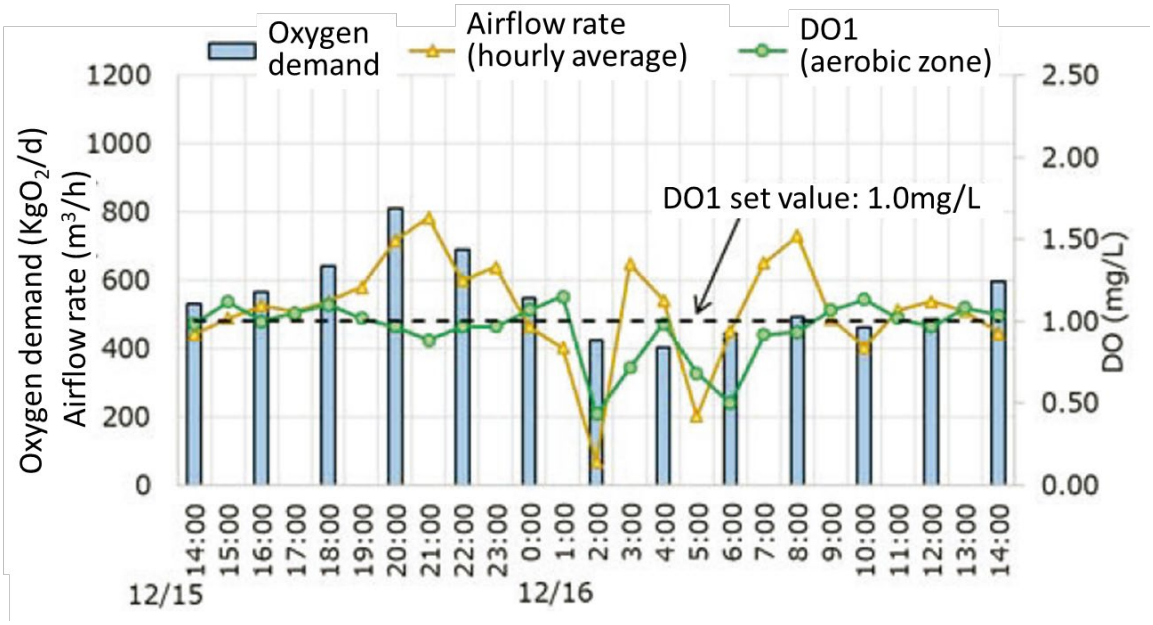

Figure 1: Time fluctuations during a 24-hour winter survey of oxygen demand, air flow

(2) Post-project survey of the Dual DO control system for the OD process

Following last year's post-survey, regular and 24-hour water quality tests were conducted at a facility adopting the Dual DO control system. In the 24-hour tests, the measured DO concentrations at two locations in each aerobic and anoxic zone confirmed that a stable DO concentration gradient was formed. Besides, as Figure 1 shows, the test verified that the supplied air volume varied according to the time fluctuation of oxygen demand estimated by the inflow water quality. The lines adopting this technology were operated under high load conditions with approximately twice the inflow per

OD tank volume compared to the control lines. However, the BOD concentrations of the treated water in the two treatment systems were similar, at less than ten mg/L at the maximum value during three months.

(3) Consideration of the implementation procedure of the treatment performance enhancement technology

The study found a simple selection procedure for some cost-effective options among many treatment performance enhancement technology combinations.

3. Conclusion of the Whole Study Period

As a result of this five-year research, the JS New Tech Implementation Program selected two new treatment performance enhancement technologies. The post-project survey at the facility adopting the Dual DO control system for the OD process confirmed that the system effectively performed and generated treated water of good quality. Based on the study results, the post-project survey will be continued in FY 2022 to standardize the technology. On the other hand, the research found the versatile implementation procedure of the practically used treatment performance enhancement technology to promote adoption.

The research will continue to establish more generic implementation procedures.

Keywords: **Treatment performance enhancement technology, Dual DO control system**