

Expansion of Anaerobic Digestion and Biogas Utilization

(Research of FY 2017-2021)

1. Purpose

The establishment of the Comprehensive Project for Promoting Wide-Area Sewerage System will increase the opportunities for municipal WWTPs to accept human waste and septic tank sludge.

The WWTP has accepted human waste and septic tank sludge for some time under the MICS (Joint Maintenance Business for Sewage Treatment Facility Project.) On the other hand, it is not clear what should be considered when accepting human waste and septic tank sludge at a higher ratio than before.

This study aims to clarify the requirements for integrating sewage sludge into the WWTP and the critical points in the design of WWTPs.

2. Outcomes of This Year

(1) A questionnaire survey was conducted on municipal WWTPs that have already accepted human waste and septic tank sludge through MICS projects. The survey items included the acceptance ratio, acceptance location, treatment process, and problems, all for the human waste and septic tank sludge.

The actual acceptance conditions were studied at one of the municipal WWTPs that responded to the survey.

Table 1 shows the main problems and proposed solutions obtained from the questionnaire.

Table 1. Problems and solutions for accepting human waste and septic tank sludge

Impact to:	Problems	Solutions
Wastewater treatment	Increase in screenings of grit chamber	<ul style="list-style-type: none"> • Reconsidering O&M procedure • Reviewing pre-treatment system
	Rise of sludge interface and generation of floating scum in the first settling tank	<ul style="list-style-type: none"> • Reviewing operation plan including sludge interface management and scum removal frequency
	Increase in reactor influent load due to increase in fine SS and soluble organic content	<ul style="list-style-type: none"> • Reviewing operation plan including an increase in airflow volume
Sludge treatment	<ul style="list-style-type: none"> • Increase in coagulant injection rate for dehydrators 	<ul style="list-style-type: none"> • Reviewing operation plan including chemical injection rate and chemical type
	Pipe clogging caused by impurities	<ul style="list-style-type: none"> • Consider installation of comminutors • Review of the pre-treatment system
	<ul style="list-style-type: none"> • Sludge surfacing in gravity thickener during summer 	<ul style="list-style-type: none"> • Reviewing operation plan including SS Retention time and sludge interface management

(2) Based on the results of the questionnaire survey and the existing literature, the consideration approach was summarized for receiving facilities.

- Arrangement of conditions for accepting coagulated sludge
As conditions for accepting coagulated sludge, we summarized points to be considered in facility planning, such as the amount of oxygen to be supplied to reaction tanks and BOD-SS load and points to be considered in discharge water quality such as color.
- Setting properties of human waste and septic tank sludge
Based on existing literature and precedent cases, the concept was summarized for setting properties of coagulated sludge to be accepted.
- Development of a Design Procedure by OD Process (Draft)
Many WWTPs that accept integrated sludge through MICS project have adopted the OD process. The OD process was summarized for its confirmation procedure of the requirements for adoption of the MICS project, the examination scheme of the acceptable amount of human waste and septic tank sludge, and the setting procedure of the human waste and septic tank

sludge properties. Besides, we summarized examples of input/acceptance WWTPs, acceptance/pre-treatment facilities, and deodorization system design as reference for facility design.

3. Future Schedule

Many small and medium sized communities are likely to adopt joint treatment of human waste and septic tank sludge in the future. We will contribute to the promotion of the Comprehensive Project for the Promotion of Wide-Area Sewerage Systems by continuing our research and compiling technical data that will contribute to design.

We deeply appreciate the cooperation of all the local government officials involved in the survey.

Keywords: **Cross-jurisdiction, Collaboration, Human waste/Septic tank sludge, MICS project**