Evaluation of Sludge Dewatering Device for Lower Moisture Content

(Research of FY 2018-2021)

1. Purpose

This study conducts a post-evaluation to understand and organize the performance, maintenance status, and O&M issues of sludge dewatering devices for lower water content* after their introduction. The study aims to improve sludge dewatering devices and expand their use.

* Used as a generic term for the Type 2 screw press dewatering device, Type 2 highly efficient centrifugal dewatering device, Centrifugal dewatering device with inside two coagulants, and Type 2 rotary pressure dewatering device

2. Outcomes of This Year

The post-evaluation of dewatering devices for lower moisture content conducted last year clarified issues regarding the influence of sludge properties on dewatering performance. In 2003, we organized and analyzed long-term secular changes in sludge properties for 2005-18, as shown in the Sewerage Statistics (Japan Sewage Works Association). At the same time, we investigated the relationship between the sludge properties of the supplied sludge, including solids concentration, ignition loss, fibrous materials, and dewatering performance, such as the moisture content rate of dewatered

cake or the treated amount based on test operation data of dewatering machines for lower moisture content.

(1) Secular changes in Sludge Properties

Both thickened and anaerobically digested sludge showed an increasing trend in ignition loss from 2005 to 2018. Comparing the median values by each year, the ignition loss of thickened sludge and anaerobically-digested sludge showed almost linear trends, from 83.0% to 86.0% and 68.9% to 73.7%, respectively.

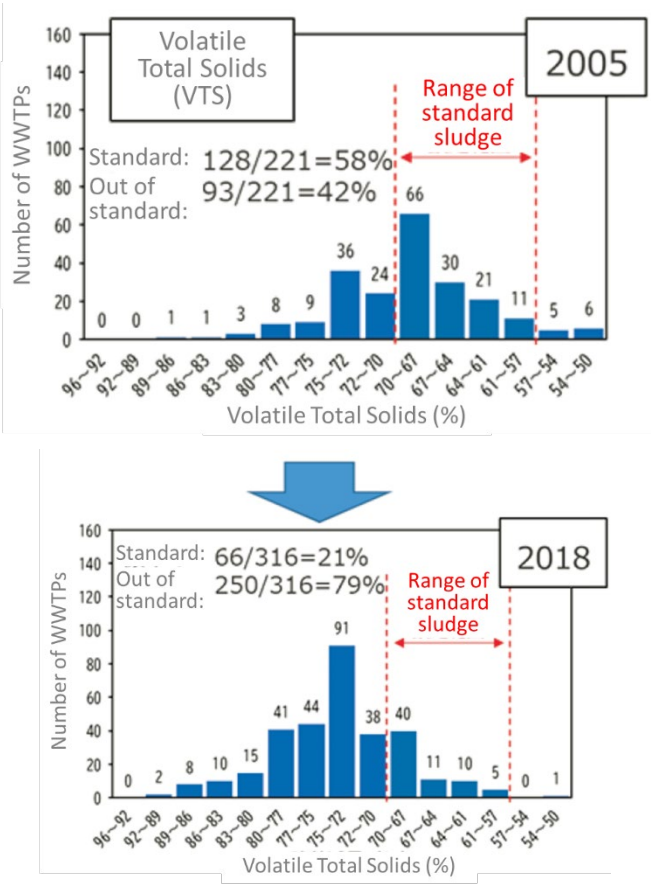

Figure 1: Distribution of the number of WWTPs per VTS

Figure 1 shows the distribution of wastewater treatment plant numbers by their ignition loss values of anaerobically digested sludge. When comparing 2018 with 2005, the peak number of treatment plants slid toward the higher concentration side. The ratio of treatment plants exceeding the design range of standard sludge (57-70%) in the Standard Specifications Manual for Machinery and Equipment (Japan Sewage Works Agency) increased from approximately 40% to 80%.

(2) Relationship between sludge properties and dewatering performance

Analyzing the relationship between various sludge properties and dewatering performance by dewatering devices shows an apparent correlation between the dewatered cake's moisture content rates and fibrous materials.

(3) Conclusion

- From 2005 to 2018, the ignition losses of thickened sludge and anaerobically-digested sludge increased yearly, which showed that the difficulty of sludge dewatering was progressing. With the increase in the ignition loss, there was a gap between the design range of standard sludge in the Standard Specifications Manual for Machinery and Equipment and the actual status.
- As with the supplied sludge's solid concentration and ignition loss, fibrous materials are considered essential data for the operation management of dewatering devices. Choosing the best model and evaluating a dewatering machine to retrofit the facilities is still crucial.

3. Summary of the whole study period

- In 2022, the secular changes in the sludge supplied for dewatering machines were investigated. As a result, ignition loss was divergent between the standard sludge and the designed range value. The study results contributed to revising the standards as a fundamental resource.
- Investigation of the performance of dewatering devices for lower moisture content during 2019 and 2021 confirmed that it almost satisfied the performance value of the Standard Specifications Manual for Machinery and Equipment of the Japan Sewage Works Agency.
- This study standardized the Type 3 Press-in Screw Press Dewatering device in 2022.

Keywords: **Dewatering device for lower moisture contents, Volatile total solids, Fibrous materials, Moisture content rate of dewatered cake**