

Study on the Functional Improvement of Melting Facilities for Area-wide Sewage Sludge Treatment

Whole term

1992.10 ~ 1994.3

(Purpose)

Area-wide treatment projects of sewage sludge (ACE plan) were started by Japan Sewage Works Agency aiming at smooth and appropriate treatment of sewage sludge in a region from a long-term point of view. Currently, four ACE centers are in operation in the Kinki region.

Among the four centers, Osaka Northeast center and Hyogo West center adopted the coke bed melting process. The operation progress has been satisfactory and the treatment performance has been stable.

However, since it has been three years that they started operation, the following studies were required to achieve increased economy, better efficiency and stability of treatment.

1. Study on the efficiency of sludge melting furnace –Osaka Northeast and Hyogo region

The study was conducted, considering the characteristics of the coke bed process, to decrease the operation cost and to improve the function of the furnace.

2. Study on efficient sludge drying –Area-wide treatment project of sewage sludge in Hyogo region

Out of the different types of sludge accepted by Hyogo West center, the study was conducted to develop a new drying system suitable for colloid-type sludge, which will considerably increase in the future.

(Results)

1. Experiments with small-scale melting furnaces were conducted to judge the viability of “powdered sludge blow-in process”. The parameters considered were scale-up factor, treatment sludge amount, consumption of cokes, combustion temperature and air volume for sludge combustion.

1) Coke consumption decreased with the increase of sludge amount.

2) Coke ratio is defined as coke consumption required for treatment of dissolved solids (DS) per unit time. The operation result of approximately 23%-DS was obtained in the experiments, which means that about 40-50% of decrease in coke ratio compared to the previous process.

3) The operation was found to be unstable because the small-scale furnaces radiated more heat than normal-scale furnaces.

2. Experiments with mobile drying machines were conducted to judge the viability of “centrifugal membrane drying machine”. The parameters considered were characteristics of colloid-type sludge, drying performance and quality of wastewater from drying process.

1) The moisture content of approximately 40% was achieved when the loading of concentrated sludge supply was 120-140L/hr at a moisture content of 78%. Drying was completed without absorption. Moreover, it was confirmed that the moisture content of dried sludge can be controlled by the sludge supply control.

2) A better performance in terms of evaporation rate ($70-130 \text{ kg/m}^3 \cdot \text{hr}$) was achieved considering the evaporation rate ($80-90 \text{ kg/m}^3 \cdot \text{hr}$) for general concentrated sludge (moisture content 85%).

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Keywords

ACE plan, coke bed melting process, centrifugal membrane drying machine