

Study on the utilization of the technology of wastewater sludge-drying by means of vacuum frying

Whole term

1996. 2 ~ 1997.3

(Purpose)

In this technology, wastewater-sludge is mixed with oil, of which the boiling point is greater than that of water, because such oil can act as a heat catalyst. Then, the mixture is boiled under a vacuum, which makes the water of the sludge evaporate within a short time under a low temperature. This technology treats the sludge to possess a water content of only 1~2 %. And the weight of the sludge becomes one-fourth of the dewatered sludge. The other positive point is that the unpleasant feeling due to the odor is less than that with other technologies.

This study investigated the safety and characteristics of the application in case of treating the wastewater sludge. In addition, the operational conditions of this sludge treatment system were investigated by analyzing the variation of the characteristics of the dried sludge and wasted oil, and water and odorous components. In addition, the possibility of applying the cement recycling skill and producing fertilizer as an effective use of the sludge was investigated.

As this year is the initial year for the investigation, the cement product and the dried sludge were analyzed by the drying test of dewatered sludge from Kasagawa treatment center, and collecting and arranging the data for a full-scale test were focused on.

(Results)

The test was carried out from 6th February in 1996 to 29th March in 1996. The weight of raw sludge (dewatering cake) tested in total was approximately 500 ton.

1) Characteristics of the dried sludge

(1) 1~2 % of water content, the oil content was 25~35 % of total and the oil content tended to increase.

(2) There was no much difference in the characteristics of the raw sludge and the dried sludge.

(3) According to the results of the permeation test for predicting rainfall, there was high concentration of BOD, COD and there was no toxic material.

2) Drainage (evaporative condensed water in drying) component

(1) Water in the raw sludge drained as water was condensed. The quantity was 12m³ per 15 ton raw water/day.

(2) The condensed water consisted of high concentrations of BOD, COD, NH₄-N and n-hexane.

3) Odor

(1) Dried sludge generated a strange odor.

(2) Concentration of the odor before and after the operation in the drying equipment, and the odor around the stock yard were low. There was no much difference in the condition of odor before and after the operation.

4) Condition of the recycled cement

(1) Energy generated was 5,000 cal/kg and it is enough as a heating source.

(2) The low input in the test did not effect on the cement production.

Future study will be as follows:

1) Factors caused stabilization of the dried sludge are characteristics of sludge, used oil and operational conditions. Therefore, it is necessary to conduct tests on the type of the raw material, oil-mixing ratio, centrifugal condition of oil and the drying time.

2) According to the results of the above test, the operational conditions and the design factor can be checked.

3) It is necessary to examine the application characteristics, economical efficiency, safety and stability.

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Keywords

Drying by vacuum flying, Wasted oil, Utilization as cement