Joint Research on Biomass Methane Fermentation in Suzu City

Year of Research	2007・2008	

(Purpose)

Suzu City faces several problems. One is the high cost burden of public administration because sewage sludge, night soil, garbage and so on are individually treated and because the consignment disposal expense of the sewage sludge has risen because of an increase in the amount of sewage sludge which is exhausted, applying financial pressure. And in addition, the city must construct a new night soil treatment plant in response to the merger of municipalities. Therefore, it was necessary to develop a sludge treatment process to comprehensively solve these problems. Facilities for combined processing of not only sewage sludge but also night soil, septic tank sludge, rural sewage sludge, and garbage were constructed in the existing Suzu Purification Center. In these facilities, these biomass are mixed and fermented. Biogas generated by the fermentation of mixed sludge is utilized as an energy resource to heat the fermentation tank and dry the fermentation residue (sludge). Furthermore these types of dried sludge are formed and recycled as fertilizer in the local area. This fermentation facility was constructed based on technical elements of joint research in 2005 by Suzu City and the Japan Institute of Wastewater Engineering Technology for practical use. Full-scale operation of the fermentation facility started in August 2007.

This paper is a result of performance evaluation research conducted from 2007 to 2008.

(Results)

(1) Evaluation of properties of the collected biomass

○The solid quantity (TS) of collected biomass was about 75% of the design value. The organic matter quantity (VS) of collected biomass was about 70% of the design value. The actual values were below the design values because part of the garbage expected to be carried was traded as a valuable resource instead of being carried into the facilities.

(2) Evaluation of the appropriateness of the facility specifications and the target performance

○The garbage recovery rate of a crushing and separation machine was 90.8%,which satisfied the design value (More than 90%).

○Because the VS concentration put into the fermentation tank changed with the passage of time because the collected biomass was carried intermittently,it was difficult to grasp the value of the VS degradation rate and the gas volume per decomposition VS.As a result of values analyses, the VS degradation rate was 46.6% (design value more than 45%) and the gas volume per decomposition VS was 978L/kg-decompositionVS (target value more than 550L/kg-decompositionVS).

(3) Possibility of utilizing the dried sludge as fertilizer

○The safety of dried sludge was confirmed. The harmful components content was below the standard values for all harmful components indicated in official specifications for ordinary fertilizer (The results of a dissolution test of heavy metals,etc., were also below those stipulated by enviromental ordinances).

○Judging from the fact that the EPA(Class A regulations pertaining to disease-causing bacteria when applying sewage sludge on land)is satisfied under dry operating condition, it is concluded that there are no safety problems.

(4) Impacts on water quality of existing wastewater treatment facilities

○BOD,SS and T-N of the final effluent water in this study was less than the target value (BOD 5mg/L,SS 5mg/L,T-N 5mg/L) in the case of operation control at Suzu Purification Center except during initial use of the facilities. The recycle flow had only slight impact, so it is assumed that it is not a problem.

(5) Environmental impact

○Odor analysis results show that at one location, the odor intensity target value (2.5) was exceeded. But this result was due to unbalanced intake by deodorization facilities. After adjusting intake balance of deodorization facilities, odor intensity satisfied the standard value at all locations.

(6) Effects of introduction of facilities

○A comparison of the life cycle cost of the concentration treatment1) with that of individual treatment2) predicts that concentration treatment could reduce the life cycle cost by about 43,000,000 yen within a year.

○After checking greenhouse gas emissions during 19 years from 2007 to 2025 (target year for planning of sewerage construction), it was calculated that the concentration treatment[1)] can reduce CO_2 emissions by 4,500 ton-CO_2 from the level of individual treatment[2)].

1);To treat at the biomass methane fermentation facility

2);To treat each biomass as before

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