Joint Research on Biomass Methane Fermentation

Whole term	2005.8 ～ 2006.3	

(Purpose)

The Suzu Purification Center (total planned sewage handling capacity：3,820㎥ per day), which is an existing sewage treatment facility located in Suzu City, was planned to accept not only sewage sludge but also human waste, purification tank sludge, drainage sludge from rural villages, and food waste from businesses；to treat the above items through complex methane fermentation；to collect energy as biogas；and then to convert sludge that remains after treatment into fertilizer using this energy. This plan was adopted as the first project to promote the effective use of biomass within the recycling promotion program (utilization of unused energy) of the Ministry of Land, Infrastructure, and Transport's "New-Generation Sewage Support Scheme". Technical elements for research toward practical application were established in Suzu City in FY2005 and facility construction began in FY2006. Plans call for performance evaluation and research to take place at the actual facility from FY2007. This document provides an overview of research toward practical application that was conducted in FY2005.

(Results)

1. Methane fermentation experiment

・A comparison of an analysis of biomass produced in Suzu City with planned values showed that, overall, there is no significant deviation from planned values for TS (%) and VS (% TS). Thus, it was decided to adopt the planned values as facility design elements.

・It was determined from temporal changes in amount of gas produced (integrated value) from each substrate during the methane fermentation experiment, and from the pH (roughly 7.5) and ORP (－350 mV) of each substrate during the fermentation experiment, that fermentation is not being inhibited and that complex methane fermentation is proceeding favorably.

・Based on the results of the methane fermentation experiment, the target VS decomposition rate and required number of retention days were set at 45% (maximum B／C) and 19 days, respectively.

2. Environmental impact

・Based on the results of returned water load calculations, it was discovered that the quality of effluent can be maintained by altering the operation conditions of existing water treatment facilities (extending aeration time).

・Based on a study of odor conducted at lot edges and exhaust ports of deodorizing facilities at this facility as well as human waste treatment plants having similar facilities, it was discovered that an adequate odor environment can be maintained at the edge of the facility's lot by installing appropriate deodorizing facilities.

3. Possibilities for returning dried sludge to green farms

・An analysis of the major components of dried sludge (methane fermentation residue) showed that it has high percentages of phosphorus and potash. The safety of dried sludge was confirmed in that its harmful components fell below standard values for all harmful components indicated in official specifications for ordinary fertilizer (The results of a dissolution test for heavy metals, etc., were also below Ministry of the Environment ordinances).

・The hygienic safety of dried sludge was also confirmed, as drier operating conditions meet standards of the EPA in the United States (Class A regulations pertaining to disease-causing bacteria when applying sewage sludge on land).

4. Economic efficiency

・Calculation of work expenditure for intensive treatment at this facility and work expenditure for treatment of individual forms of biomass showed that, overall, reduced expenditure and increased revenue could be expected through introduction of this facility. One reason for this was a significant reduction of expenditure for outsourcing of waste disposal.

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key words	Biomass, Methane fermentation