Joint Research on Dewatering/Incineration Systems Intended to Achieve Zero Supplemental Fuel

Year of research	2009～2012	Research of resource and energy in sustainability

(Goals)

Incineration is frequently used to reduce sewage sludge. Sewage-sludge incinerator emits large quantities of greenhouse effect gases, and when N_2O emitted by incineration in particular is converted to CO_2, it is found to account for about 30% of greenhouse effect gases emitted from wastewater treatment plants. A widely used N_2O emission reduction countermeasure is to perform incineration with the temperature inside the furnace raised from the conventional 800ºC to 850ºC. But, even though greenhouse effect gas reduction effects are obtained, supplemental fuel must be increased, and the production of greenhouse effect gas and rise of maintenance costs accompanying this increase of supplemental fuel are negative factors.

Lowering the water content of dewatered sludge during incineration on the other hand, is known to be an existing technology which can reduce supplemental fuel through self-sustained combustion. But generally, fluctuation of water content or sludge properties makes it difficult to maintain stable combustion in the self-sustained combustion range.

This research is intended to contribute to the lowering of maintenance costs and the reduction of greenhouse effect gases by reconstructing everything from dewatering equipment to incineration equipment as a unified system to stably permit self-sustained combustion incineration.

Thus, the goals of this research are to perform basic testing using existing equipment and verify technologies through operating the actual equipment after the reconstruction, and at the same time, organize precautions related to planning, design, and maintenance of the equipment and summarize the findings in technical documents.

(Results)

The following are results of research conducted in 2010.

This technology consists of four basic components: dewatering technology to obtain low water content dewatered sludge of 72%±2 points, transport technology to stably supply this dewatered sludge to an incinerator, incineration technology for stable incineration, and measurement technology to monitor the quantity of dewatered sludge supplied to the incinerator.

From the end of 2009 until 2010, dewatered sludge emitted by a double-layer cylindrical filter press was used to perform trial transport and trial measurements, confirming that it can be used as working equipment. A self-sustained combustion incineration test was performed using an existing incinerator, and data concerning equipment and methods etc. necessary for stable self-sustained combustion were collected.

(1) Dewatering equipment: it was confirmed that it is possible to perform dewatering in the range of 72%±2 points using the double-layer cylindrical filter press.

(2) Transport equipment: it was confirmed that it is possible to use a progressing cavity pump to transport low water content dewatered sludge. And pump specifications for the working equipment were decided by clarifying fluidization properties of low water content sludge.

(3) Incinerator: it was confirmed that it is possible to perform self-sustained combustion incineration of low water content sludge without supplemental fuel.

(4) Dewatered sludge transport use measuring equipment: it was confirmed that, by adjusting the parameters, it is possible to measure the flow rate of low water content sludge using electromagnetic flow meter.

(Future plans)

(1) 2011: It will be confirmed that development targets can be achieved by renewed incinerator.

(2) 2012: Knowledge obtained will be summarized as technical documents.

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