Joint Research Concerning Sewage Sludge Carbonization Technology to Secure Phosphatic Fertilizer Raw Materials

Whole term	2006.4～2007.7	Text P.139～P.144

(Background of research)

The Gunma Prefectural Government invited applications concerning treatment technology such as carbonization of sludge, and judged that the potential of carbonization technology in a low range of temperature would be high, and began to do a research study on it in 2002. As a result, it has been confirmed that a carbonized sludge generated at a carbonization temperature of about 500ºC contains citric soluble phosphorus and soluble phosphorus of at least 5% or more, and has a component equivalent to that of a fused silicate phosphate fertilizer which is a fertilizer raw material. Under low-temperature carbonization operation, usually, a countermeasure has to be taken for tar which inhibits the growth of plants, but the problem of tar has been solved by employing a two-stage carbonization system of "carbonization" + "removal of tar."

The function advancement promotion business (of a type of using a new technology) in the new generation sewage aid business system was adopted in 2006, and we started a practical implementation study.

(Purpose of research)

The purpose of this research is to establish and confirm technical specifications to put this technology (two-stage carbonization system) into practical use in cooperation with the Gunma Prefectural Government, and we started this practical implementation study on the basis of a research plan in 2006.

We implemented demonstrative tests using dewatered sludge in every four season, confirmed the quality of carbonized sludges throughout the year, implemented a continuous running test in a series of processes of drying to carbonization, and evaluated the system.

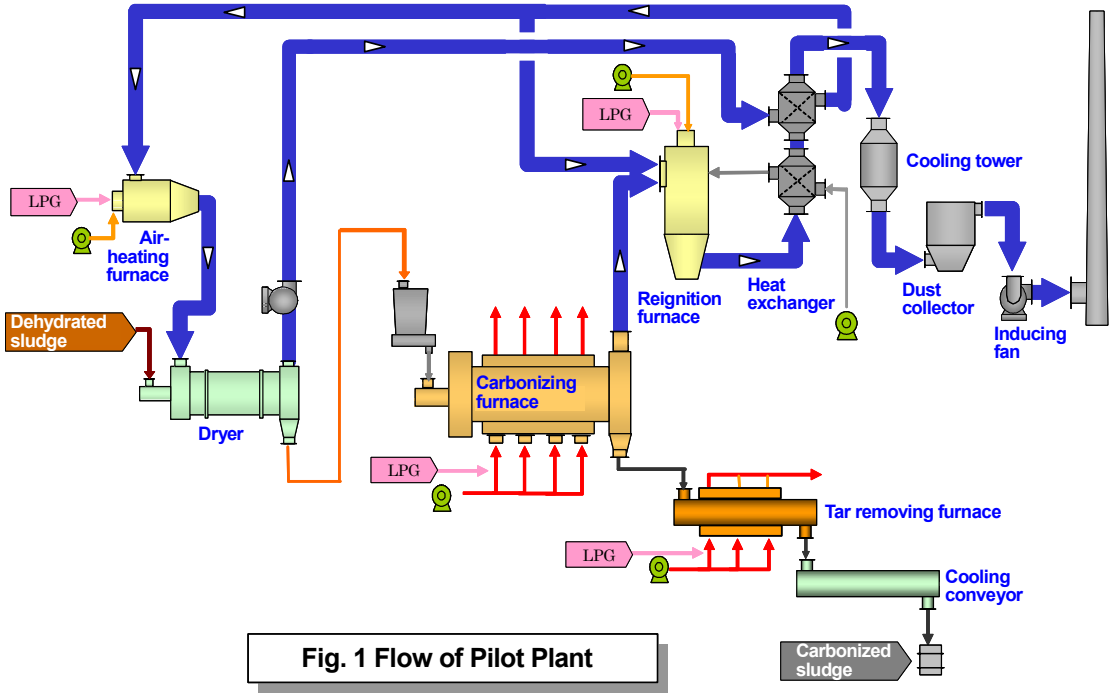

Fig. 1 Flow of Pilot Plant

(Research items)

(1) Establishing optimum operating conditions and a facility basic system

(2) Grasping seasonal fluctuations of dewatered sludge and carbonized sludges

(3) Evaluating an influence upon operation, maintenance manageability and surrounding environment

(4) Evaluating economical efficiency

(Results of research)

(1) Optimum operating conditions

1) Carbonizing furnace Temperature in the furnace: 500ºC

2) Tar removing furnace Temperature in the furnace: 430ºC
Residence time: 20 min. or more
Pressure in the furnace: -0.1 kPa

(2) Seasonal fluctuations of dewatered sludge and carbonized sludges

If the concentration of citric soluble phosphorusic acid in dewatered sludge is 1.5%-DB or more, 5%-DB or more of a target value can be secured throughout the year as the concentration of citric soluble phosphorusic acid of a carbonized sludge.

(3) Evaluating an influence upon operation, maintenance manageability and surrounding environment

In the pilot plant performing a series of processes of drying to carbonization, stable operation is possible.

The content of a hazardous material in a carbonized sludge clears a value specified in the Fertilizer Control Law.

The liquation amount of a hazardous material in a carbonized sludge also clears a value specified in the soil environmental standard.

(4) Evaluating economical efficiency

14,240 yen / t per dewatered sludge at a level of 40 tons / day (when a carbonization temperature is 500ºC, white smoke is prevented, and a scrubber is provided)

(Schedule)

We will write a report on this research toward the end of the first half of fiscal 2007. Following the completion of this research, in and after the second half of fiscal 2007 the Gunma Prefectural Government will draw up a basic plan for facility construction, build carbonizing facilities, and carry out evaluation research of the performance of the facilities.

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Key words	Two-stage carbonization system, removal of tar, citric soluble phosphorusic acid, effective use