Study on Performance Assessment of the Technology to Recycle Sewage Sludge for Cement

Whole term	1992. 4 ～2005. 3	Text P.141～P.146

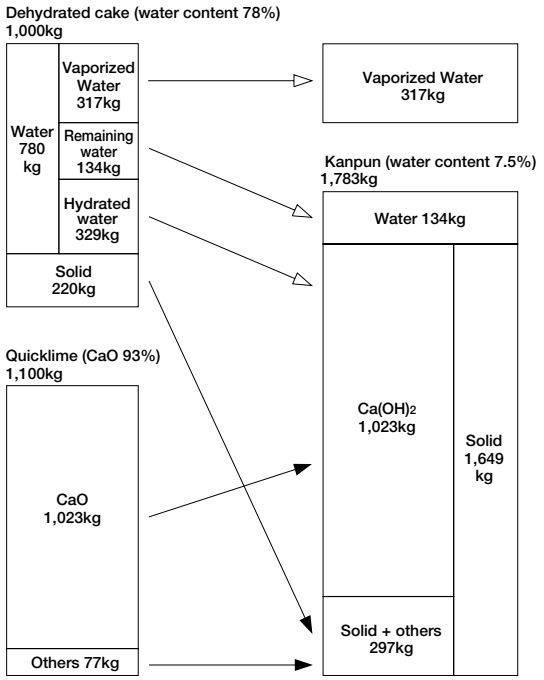
(Purpose)

This technology has been developed as an effective sludge utilization system for Nara Prefecture, an inland area sludge disposal sites are difficult to obtain and where it is difficult to win public acceptance of installation of incinerators.

Mixing quicklime into dehydrated sludge causes heat-generating hydration, which results in the sludge d drying. The dry sludge thus generated (also called "***kanpun***") can be used as follows : the organic components for part of the energy for used in cement production, and the inorganic components, as a substitute of for limestone used as raw material in cement in the cement production line.

$$CaO + H_2O \rightarrow Ca(OH)_2 + 65.2kJ/mol$$

In this study, a performance assessment was made of the effective sludge utilization system without an incineration process and free from waste generation, namely, the sludge drying system of developed at the Nara Prefectural No.2 Purification Center, which uses quicklime originally for recycling of sewage sludge for cement raw material (hereinafter called the Recycling for Cement System).



(Results)

1. The Recycling for Cement System achieved the drying performance target throughout the year (***kanpun*** content : daily average of 7.5% or less).
2. Component of dry sludge from the Recycling for Cement System satisfactorily met the cement acceptance standard, presenting no problem for use as cement raw materials.
3. The quality of cement with the addition of dry sludge showed no difference, in components, strength and leach ate rate, from ordinary cements and proved free from any problem.
4. Dry sludge is powdery and does not flow easily because of low flowability. In addition, it has a strong entrained flow performance, so that, once it begins to collapse, the flow is difficult to stop. Such physical properties must be taken into account before use.
5. The Recycling for Cement System had no adverse impact on the working and surrounding environments.
6. To achieve the performance target and to ensure stable operation of the Recycling for Cement System, the daily maintenance method and maintenance inspections of major equipment, were summarized in a form of the maintenance chart. Methods for avoiding major troubles (flash, clogging) were also established.
7. Utility costs of the cement recycling equipment are constituted of costs of quicklime, additives, chemicals, and electlicity, and the cost of quicklime accounts for about 60%.

8. Treatment cost with the Recycling for Cement System, which is constitute of utility costs, ***kanpun*** transport, residue disposal, repair, personnel, and ***kanpun*** sales to amounted to about ¥55,000/t-ds.
9. The amount of ***kanpun*** produced in the recycling for cement system is about 1.8 times that of dehydrated sludge. Therefore, a thorough preliminary review of the supply / demand situation for ***kanpun*** must be made before introducing this system.

(Study schedule)

Findings from this study are expected to be summarized in the performance assessment document for wide application of this system.

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key words	Sludge drying, Eeffective utilization, Cement recycling equipment, *Kanpun*, Quicklime