Research on the acid-and-heat-resistant concrete produced by the melted slag of sewage sludge		
Whole term	2001. 3~ 2004.3	

(Purpose)

The fact that the exhaustion of natural resources has become a global issue, has vastly led both the government and public to make sure that there is zero-emission in each activity conducted in any field. The effective usage is evidenced in the active recycling activities proceeded in the sewerage field, and the utilization of the melted slag should be carried out extensively.

One of the problems associated with sewage is that it leads the concrete to get corroded due to the generation of H_2S by sulfate reducing bacteria such as *Thiobacillus* and etc. Not only in the sewage facility, the factory, and the facilities where acidic water flows through such as acidic hot spring water, get corroded.

This study was conducted in cooperation with the Department of Water Supply and Sewerage in Obama Town, Nagasaki Prefecture. The objective was to verify the performance of acid-and-heat-resistant characteristics of the acid-resistant concrete and the mortar produced by using sewage-melted slag under the circumstances of acidic soil and hot spring water.

1) Concrete specimen installed

(1) Acid resistant concrete (TC): recycled acid-resistant concrete hardened by steam curing and made of sewage-melted slag and special alkali materials

(2) Acid resistant mortar (TM): recycled acid-resistant mortar made of melted slag. Mainly used for repairs and with acid-resistant concrete.

(3) Normal Concrete (C): normal concrete for the propulsive pipe (Japanese sewage association specification JSWAS A-2 1st species 50). Richly mixed and highly durable concrete was used rather than the concrete that is used on foundations and etc.

2) Place of installation

(1) Hot spring water: Hot spring of Sho Jigoku in the Unsen district

(2) The land owned by Obama Town: Installation of two specimens. One was wholly buried in the underground while only a half of the other was in the underground.

(3) Inside of the actual pipe: Inside of the manhole in Unsen district

(Results)

1) The carbonized area of the acid-resistant concrete was higher than that of the normal concrete, but the layer containing silicic acid that is resistant to acid-corrosion had contributed to the compressive strength.

2) Data of the carbonized and destructed areas showed that acid-resistant concrete and mortar were highly variable in the beginning and later slowly increased as the period of exposure progressed.

3) The destructed area of the acid-resistant concrete were one third and half that of the normal concrete, in the hot spring water and in the case of buried layers, respectively. This was because the carbonized area in acid resistant concrete had contributed to the strength.

4) Though it was difficult to directly compare the acid-resistant mortar with the normal concrete, superiority of the acid-resistant mortar could be evidenced by the fact that it had the same trend with the acid-resistant concrete. Superiority was verified comparing with the normal concrete.

5) The specimen halfly-buried could have been affected by sulfate reducing bacteria and repeated dry and wet conditions. In addition, the specimen installed inside the pipe could have been affected by the expansion of precipitation of sulfuric powder containing a high concentration of H_2S gas at a high temperature. Therefore, both the above situations could have been affected not only by the corrosion that occurred in the cases of wholly-buried layer and hot spring water too; but also by a complex corrosion due to some of the other complex reasons.

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Keywords	Melted slag of sewage sludge, Acid-resistant, Heat-resistant, Concrete