

## Study on the maintenance and improvement of wastewater treatment plants

Whole term

1993. 8~1994.2

### (Purpose)

The sewerage service ratio became 47% in the end of 1992. Therefore, the maintenance cost including repair and remodeling of old plants was expected to increase. Hence, investigation of the actual situation and planning for the future were essential.

Consequently, this research was handed over to the Japan Institute of Wastewater Engineering Technology by the Public Works Research Institute, to examine the deterioration of the plants and the necessity of renewal, using a questionnaire. Then, diagnostic techniques, repair and remodeling in accordance with the cause of deterioration were arranged, based on literature surveys.

### (Results)

The maintenance cost occupied 20.7 % of the entire sewage system-cost in 1991. And the maintenance cost for the plants occupied 6.9%. Since the cost for repair of wastewater treatment plants seemed to be increasing according to a survey carried out in 13 cities, the maintenance of treatment plants would become very important in the near future.

However, from the survey carried out in 13 cities on deterioration and its correspondence, the following situations could be understood.

1) The cause of deterioration in sewerage treatment plants was mostly hydrogen sulfide, temperature stress, and drying shrinkage. The deterioration of condensing and digestion tanks due to hydrogen sulfide showed a high rate. And buildings had been deteriorated highly by the temperature stress and drying shrinkage.

2) In the past 10 years, plants had been repaired because of the deterioration caused by mainly hydrogen sulfide, and then temperature stress and drying shrinkage. There was severe noticeable deterioration in both digestion and condensing tanks due to hydrogen sulfide. The repairing method was mainly coating/lining and surface restoration by mortar. And one fourth of the maintenance-buildings and sludge treatment reactors were repaired because of the deterioration due to the temperature stress and drying shrinkage. Since there were lots of cracks, half the repairing method was injecting/inserting process.

3) The time spent for repairing hydrogen sulfide degradation was less than that for temperature stress/drying shrinkage-degradation.

4) The investigation of deterioration was divided into two categories as investigating the cause, and investigating the durability. Eye observations as well as detailed investigations were carried out.

In this investigation, a list of references on maintaining concrete structures of the plants was prepared based on the literature as follows: (1) alkali aggregate-reaction (2) salt (3) corrosive carbonic acid (4) neutrality (5) freezing and melting

(a) reason and mechanism of deterioration (b) diagnostic techniques (c) rate of deterioration (d) measures of deterioration, repairing and remodeling processes of the present establishments (e) prevention of deterioration in new establishments.

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Keywords

Concrete structure, Maintenance and improvement (repair, remodeling), Cause of deterioration