

Joint research on the anaerobic/aerobic wastewater treatment technology

Whole term

1997. 4 ~ 1999. 3

(Purpose)

The water quality of the Izumi River, Japan has been improved by the development of the sewerage system, though the environmental standards of the Sakai River, the inflowing stream have not yet been accomplished. The wastewater treatment plant using anaerobic/aerobic treatment process has been constructed and operated for domestic and livestock-industrial wastewater since 1997 at the upstream of the Sakai River. This process is a simple process using woody packed media which remove nitrogen, phosphorus, MBAS and BOD.

From 1997 to 1998, this joint research investigated the maintenance and management of this treatment plant and summarized its performance, efficiency and management method, and prepared a manual.

(Results)

1. Investigation of the inflow.

The average inflow in case of rainfalls and fine weather was 72 m³/day and 42 m³/day, respectively and the percentage of design discharge (173 m³/day) in case of rainfalls and fine weather was 42% and 24%, respectively. The retention time for the conditions of rainfall and fine weather were 2.4 and 4 times larger than the design retention time (35.6 h), respectively, thus this operational condition was within its capacity. Also, the peak fluctuation of the daily inflow occurred at 9 a.m. and 9 p.m. under the strong influence of domestic wastewater.

2. Investigation on the treatment efficiency

Composite samples from the inflow and outflow were analyzed twice a month for 12 months. The average removal efficiencies for fine weather were BOD 96.3%, SS 98.32%, COD 82.9%, T-N 76.4%, NH₄-N 76.4%, T-P 53.1%, TOC 84.7% and MBAS 97.6%.

The improvement of the water quality was investigated using BOD as an index. BOD ranged from 5% to 44%, though it was 21~44% in small streams during winter, which confirmed that there was a load reduction due to the treatment.

3. Investigation on the blocking of tanks

The blocking of each tank was investigated to calculate the frequency of backwashing. Backwashing was done after an interval of 7 months, and no strong blocking was observed.

4. Investigation on the accumulated sludge

The amount of sludge accumulated in the tank was measured to investigate the required frequency and specific method of backwashing. The measured sludge amount in the 7th tank of this plant, the capacity of which was 26.1 m², was 6.38 m² (the water content was 82 %) during one and a half year. However, considering the marginal space for backwashing and protection of the aeration pipes, this sludge should be disposed of after 2 years. In addition, the accumulated sludge contained the charcoal, the packed media in the tank, thus the organic content was as high as 76.8 % with almost no smell. The disposal method using vacuum was recommended.

5. Operational problems

In case of rain, the water from the main stream flowed backwards burying the inner part of the intake water pump-pit. Therefore, regular observations and sludge disposal from the intake water pump-pit was required for the increase of inflow from summer to fall.

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Keywords

River purification, Domestic wastewater, Organic matter, Nitrogen, Phosphorous, Backwashing