Study on the new technology of the sewage treatment with effective land usage		
Whole term	1994. 10 ~ 1996. 3	

(Purpose)

From 1992 to 1995, Nagoya city, Japan and the Japan Institute of Wastewater Engineering Technology had had a joint research for the removal of organic matters in the process combined with a type of aerobic filter called " filter-type solid-liquid separating device". Nagoya city had made efforts for innovations in the sewage treatment such as prevention of eutrophication at Ise Bay area, creation of a new water environment in urban areas and etc.

Thus, a joint research focusing on the applicability of this process to the advanced treatment was performed in 1994 and 1995. The results of this research are as follows:

① Investigation on the operational management of this process (hydrogen sulfide management, amount of organism adherence, condition of filtration resistance)

② Investigation on the applicability to advanced treatment (fluidized-bed nitrogen removal efficiency, phosphorus removal efficiency by flocculants)

(Results)

(1) Hydrogen sulfide management

In winter, the aerobic treated water should be kept circulating in the filtering solid-liquid separation device so that the concentration of hydrogen sulfide generating at the filtering solid-liquid separation device can be controlled under 10 ppm which was the concentration having no influence on the maintenance. Data are missing

(2) Annual fluctuation of the amount of organism adherence

This process was continuously observed for one year with the operational conditions such as 20 % of treated water circulation, BOD load of 1~2 kg/m^3/day, approximately 12,000~20,000 mg-VTS/L-media of organisms.

(3) Filtration resistance of the aerobic filter

From fall to winter, the filtration resistance exceeded the upper limit and overflow occurred at a filtration speed of 30 m/day of the aerobic media (20 % of treated water circulation and aerobic-filter-return sludge). Thus, the filtration rate of the aerobic filter was concluded to be stable at approximately 20 m/day in this process.

(4) Applicability of the process to the advanced treatment with respect to nitrogen removal

A small scale nitrogen removal experiment by adding a fluidized-bed denitrification tank which was filled with a sponge media up to 1 m height, to the basic process was performed from the fall to winter. The T-N of the treated water was 11~13 mg/L that did not reach the targeted quality of 10 mg/L or less.

The inflow Kjeldahl-N exceeded the capacity, and the inner-tank temperature was below 15° C in winter due to its small size, and consequently the cause of failure to achieve the targeted quality was identified as loss of digestion efficiency in the aerobic filter and denitrification efficiency in the denitrification tank. Therefore, the conditions for acquiring targeted water quality were suggested as follows:

① Reduction of water temperature should be prevented as much as possible.

② The filling height of media should be increased so that the denitrification efficiency in the denitrification tank can improve despite having a negative impact from low water temperature.

③ The discharge load should be selected in accordance with the Kjeldahl-N removal capacity of the aerobic filter (approximately 20 m/day).

(5) Applicability of the process to the advanced treatment with respect to phosphorus removal

A large scale phosphorus removal experiment by adding a device to the basic process for flocculant (poly-iron) injection was performed in winter and the results were as follows:

① The flocculant injecting point has to be installed at the front of the filtering solid-liquid separating device to control the increase of filtration resistance of the aerobic filter.

② To achieve a targeted quality of T-P equal to 1 mg/L, the necessary rate of injection was set according to the ratio between the PO_4-P and coagulants equal to 1; and that ratio was equal to 3 in order to achieve a targeted quality of T-P equal to 0.5 mg/L.

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