Investigation on transformation of the oxidation ditch (OD) process to the conventional activated sludge process		
Whole term	1993. 10~1994.3	

(Purpose)

Omagari and Yokote Treatment Plants of Akita Bay and Omono River Regional Sewerage had capacities of 45,000m^3/day and 49,200m^3/day, respectively. It was in the aforementioned treatment plants that the conventional activated sludge process with a mechanical aerator was installed for the first time in Japan. However, as the first alternative in the case of low flow rates, the configuration of the reactor had been decided by the application of OD.

As the shape of the reactors at the aforementioned treatment plants had been designed as an endless channel peculiar to the OD process, much investigation was required to use the same reactors as the reactors of the conventional activated sludge process. Since, the inflow rate was in the increasing phase, a primary settling tank was constructed to transfer towards the operation of the conventional activated sludge process which was the original planning, and as a result, it can be predicted that the treatment capacity would be thrice increased.

By adding a primary settling tank, suspended solids would be removed and many dissolved matters would flow into the reactor. There would be two kinds of sludges such as raw sludge of primary settling tank and excess sludge, of which the characteristics such as the ability to be dewatered and etc. are different.

This study investigated how to replace the conventional activated sludge process with the OD reactor in consideration of the difference between the OD and the activated sludge process. In addition, the effects on water and sludge treatment due to the installation of the conventional activated sludge process were investigated and necessary activities were proposed.

(Results)

1) Existing conditions of the treatment

(1)The quality of the treated effluents by the OD process of the Omagari and Yokote treatment plants has been acceptable since 1992 to the date of investigation.

(2) Denitrification by the intermittent aeration of the rotor made the rate of T-N removal 55~70%.

2) Effect of installing a preliminary settling tank

(1) The surface loading to the primary settling tank, and the BOD-SS loading to the aeration tank satisfied the standard design factor according to the planned flow rate and the targeted water quality. However, according to the required oxygen content in the aeration tank, the ability of the rotor to supply oxygen was not sufficient for nitrification despite it was satisfied with the organic matter removal. Therefore, there would be a possibility for NBOD to accumulate.

(2) The secondary settling tank satisfied the standard design value until 2000.

(3) Omagari treatment plant possessed a sufficient capacity for sludge treatment until the year 2000. However, Yokote Treatment Plant needed to be provided with a dewatering tank in 1995.

(4) Because SS is removed in the primary settling tank, bulking in the aeration tank was expected. Therefore, it was pointed out that there would be an incomplete settlement in the secondary settling tank.

3) Future assignment

(1) OD operation until the operation of primary settling tank.

It will be necessary to pay attention on NBOD when the inflow increases to over 2000m^3/day and 4,000m^3/day in the Omagari and Yokote Treatment Plants, respectively.

(2) Sludge characteristics and the water quality after installing a primary settling tank.

After the operation of the primary settling tank, it is necessary to check the water quality, because the loading of dissolved matter into the aeration tank may increase. And it is necessary to check the

condition of solid-liquid separation in the aeration tank in relation to the observation of microorganisms and the condition of settlement.

(3) Sludge treatment after the operation of the secondary settling tank.

Different raw sludge was generated to some extent immediately after the operation of the secondary settling tank. Attention should be paid upon the possibility of increasing the generated sludge. Especially, raw sludge is more likely to produce bad odor. In that case, it is necessary to strengthen maintenance and management.

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