

**Investigation on the transfer of the existing OD (Oxidation Ditch) process
to the conventional activated sludge process**

Whole term

1993. 10 ~ 1997. 3

(Purpose)

Yokote and Omagari Sewage Treatment Centers in Akita Bay and Omono River Regional Sewerage had then achieved fair effluent quality for organic matters and nitrogen removal with the oxidation ditch process. Gradual transfer to the conventional activated sludge process by a stepwise construction of a final settling tank had been planned in order to increase the treatment capacity as a preparation for the future increase of the inflow.

In 1993, a study to investigate the influence on the management and operation if the OD process would be transformed to the conventional activated sludge process, was performed.

In 1994, a study to investigate the actual treatment capacity of the OD process and the mechanical aeration was performed.

In 1995, the operational method of the rotor according to the future increase of inflow was investigated and the improvement of the digestion and denitrification efficiency and energy-efficiency was analyzed.

(Results)

(1) Site investigation (Yokote Treatment Center)

The inflow rate had increased to 2,900 m³/day in the summer and 3,300 m³/day in winter, which was approximately a 10 % increase in comparison with the year 1995.

Due to the operation of the preliminary settling tank, dissolved matters increased by 20 % , though the load of the OD tank reduced indicating 60% of SS and 20~30% of BOD/COD reduction. Careful control for the increase of the load was needed, although the loss of the sludge precipitation was not observed.

The treated wastewater quality was good with BOD and the SS index, and also positive conditions for nitrification with sufficient A-SRT in summer and winter were maintained. With respect to denitrification, the condition in summer was fine, however in the winter MLSS concentration was less as 60 % of that in summer resulting in a loss of the nitrogen removal efficiency even with the same denitrification speed.

The inflow load increased in addition to the increase of the sludge treatment capacity, thus BOD and T-N concentration of the inflow were quite high and the influence on the OD tank was also large.

In case of nitrification and denitrification, according to the oxygen-providing efficiency of the aeration facility in the existing system, the critical treated wastewater quantities of nitrification and denitrification operations if an aeration facility is installed, were estimated to be approximately 4,000 m³/day and 7,000 m³/day, respectively. If nitrification is included with an aeration facility being installed, the critical treated water quantity of nitrification and denitrification operations will be approximately 5,000 m³/day and 8,000 m³/day, respectively.

(2) Water treatment system after the next series

Following four methods were investigated and compared for the selection of the method of treatment; assuming that there would be no change to the plan of the sewage system, and considering the experiences from past operations, technology trend of the activated sludge method, the economy and flexibility for enlargement, the discharge conditions and the local environmental conditions.

- ① Conventional activated sludge process (endless channel-type reaction tank)
- ② Conventional activated sludge process (multi-stage reaction tank)
- ③ Long-term aeration process (step-feed multi-stage reaction tank)
- ④ Low-loading activated sludge process with a preliminary settling tank

For the above four methods, models based on the calculation of the schematic capacity were designed and analyzed with respect to the allocation of a plan, design of the facility, treatment capacity, maintenance and the economy. As a result, the condition and policy for selection could lead to a very different conclusion as that the primary focus should be well-examined.

Collaborators: Southern Regional Sewerage System Office Akita Prefecture
Japan Institute of Wastewater Engineering Technology

Personnel in charge of the study: Akira Yamane, Masumi Isono, Shigeaki Ichino, Morio Hosoya

Keywords

Conventional activated sludge process, OD process, Promotion of nitrification/denitrification