

Joint research about the effect verification of new water-treatment system in Yokosuka City

Year of Research

2013

Water quality improvement
by advanced sewage treatment

(Purpose)

In this research, the future treatment plant influent quantity based on the decrease-in-population tendency in recent years is presumed, and advanced wastewater treatment system (simultaneous anoxic-oxic process using a NADH sensor) which carried out comparison examination of LCC by FY2013 fiscal year is scrutinized. And before conducting a future actual proof experiment, the temporary NADH sensor was used and It aimed at performing verification fundamental about the possibility of grasp of a nitrogen elimination state of the bioreactor of a deep structure by a field experiment.

(Result)

(1) Scrutinization of advanced wastewater treatment system

The research in FY2013 examined advanced wastewater treatment system based on the amount of plan sewage in the present sewer overall plan (target year: FY2024). This research made the trial calculation of the treatment plant influent quantity by 2040 in consideration of the reconstruction business schedule for a future institution.

And LCC for every advanced wastewater treatment system was compared and it scrutinized about the economical system.

As a result, in treatment by IV system , simultaneous anoxic-oxic process of Anaerobic-anoxic-oxic type was advantageous.

(2) The check of institution capability

The result of having performed capacity calculation at the time of advanced wastewater treatment system introduction, in treatment by IV system ,it turned out that the amount of the maximum treated water of a bioreactor is 76,500-m³/day. Furthermore, it has checked that it was possible to process also in the capacity and the water vein relations of existing of a primary sedimentation basin, a final sedimentation tank, and a sterilizing chamber.

(3) The check of nitrification liquid circulation

Sludge sedimentation at the time of an aeration stop is anxious about stagnation of down stream processing, When the amount control of winds by a NADH sensor is applied to the bioreactor of a deep structure as a simultaneous anoxic-oxic process. When use of nitrification liquid circulation was considered as the measure, the summer's nitrification liquid circulation is unnecessary and it became a value near the standard flow velocity in general by extrusion of influent quantity and the sludge quantity returned. Winter became in general the same as the standard flow velocity by increasing the quantity of the nitrification liquid circulation amount of water which is needed in order to complement the insufficiency of a denitrification action. From these things, it checked that stagnation of down stream processing by sludge sedimentation did not occur.

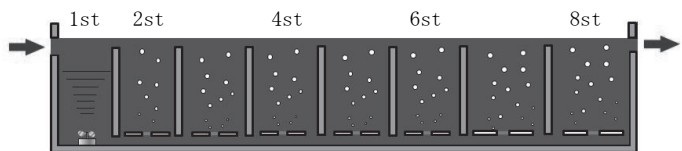


Fig. 1 Composition of bioreactor in field experiment

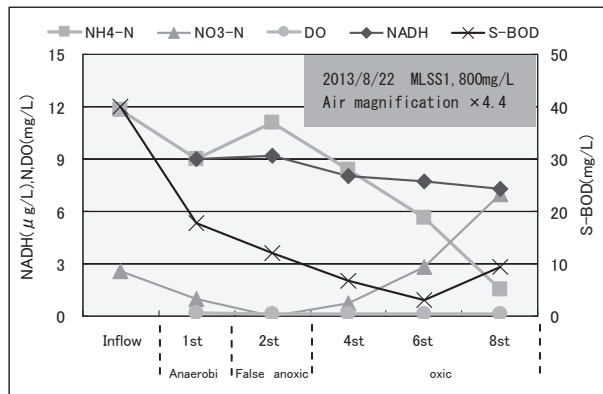


Fig. 2 Flow direction investigation, August (low DO conditions)

(4) The field experiment using a temporary NADH sensor

Fig. 1 shows the composition of the bioreactor in a field experiment. **Fig. 2** shows the result of uniting with the flow of a sewer, moving a NADH sensor, and investigating the action of the numerical value of NADH in a flow direction in a bioreactor. From **Fig. 2**, the range of the concentration from which the concentration of DO is hardly detected has also checked that the numerical value of NADH decreased gently with reduction of S-BOD, or the rise of NO₃-N. That is, if a NADH sensor is used even if it performs operation by simultaneous anoxic-oxic process in the state where the concentration of DO is low, the state of nitrogen elimination can be grasped exactly.

(Conclusion)

This research showed the following things.

- The suitable advanced wastewater treatment system and institution capability in a water factory.
- In simultaneous anoxic-oxic process, there is no stagnation of down stream processing by sludge sedimentation.
- If a NADH sensor is utilized, the state of processing of the nitrogen in the bioreactor of a deep structure can be grasped exactly.

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Key words

Advanced wastewater treatment, Simultaneous anoxic-oxic process, NADH sensor