

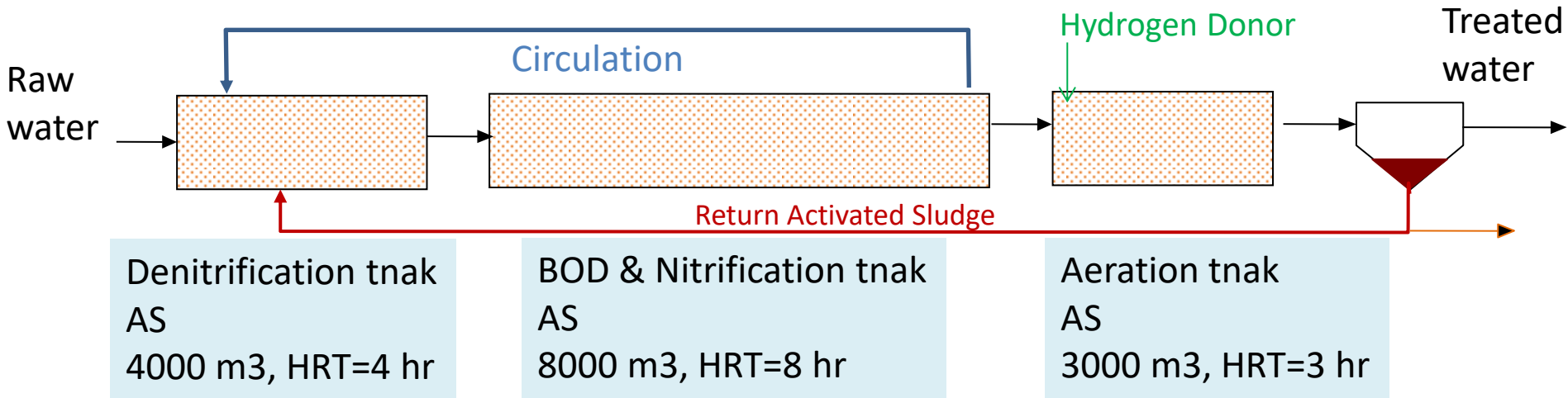
## Contents

- About Kuraray
- About Aqua division of Kuraray
- About PVA GEL
- N removal system by using PVA gel
  - Sewage Treatment
  - Pretreatment of Water Supply – River Water

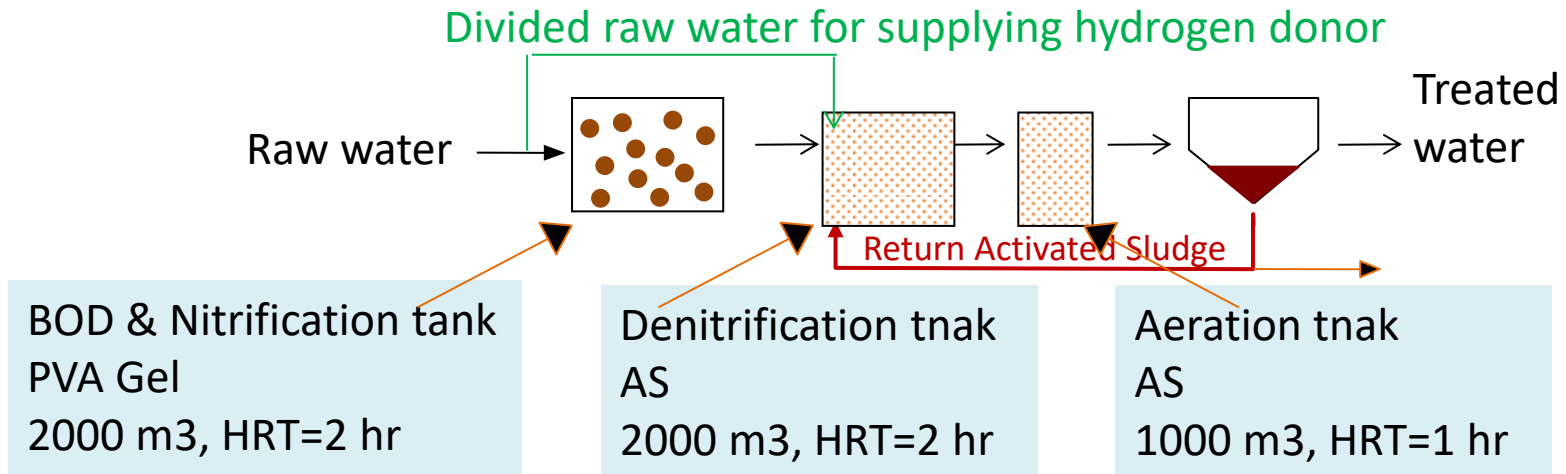
# Sewage treatment system by using PVA Gel

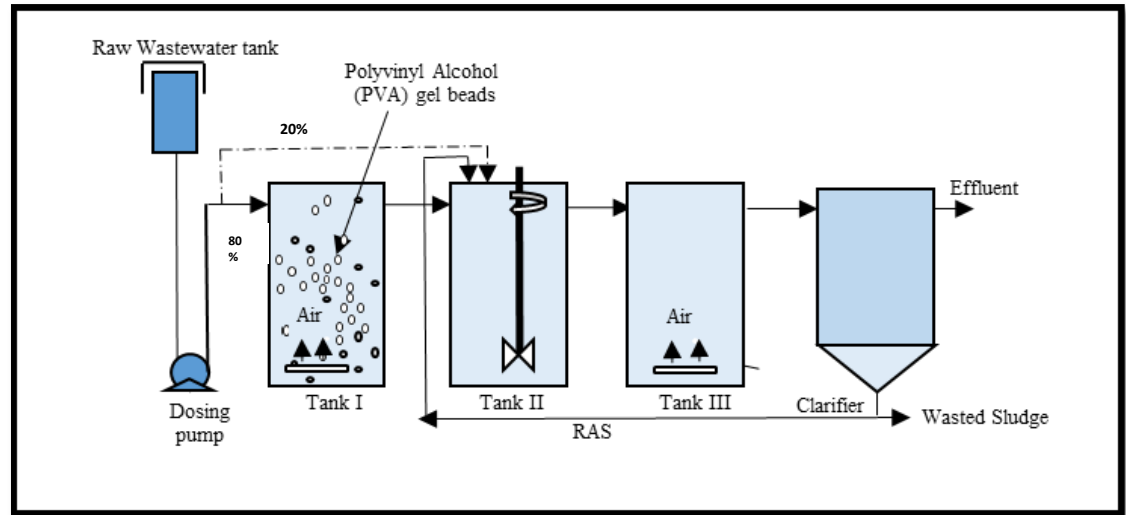
Example case, Inlet BOD = 250 mg/L, N=50mg/L, Q = 24000 m<sup>3</sup>/d  
Outlet BOD < 10 mg/L, T-N < 10 mg/L, NH<sub>4</sub>-N < 5 mg/L

## ● Conventional Activated Sludge System ( Total HRT=15 hr)



## ● PVA Gel System ( Total HRT=5 hr)





Flow Diagram of Pilot-Scale Reactor

Photograph of Pilot-Scale Reactor



Inlet and Outlet water



## CONCLUSION BY IIT ROORKEE

PVA gel provides very high specific surface for complex bacterial community for nitrification, simultaneous nitrification-denitrification and organic removal in the same reactor **under HRT 5 hr. condition.** Finally, it can be concluded that the above configuration can provided **BOD, TSS & TN < 10 and NH<sub>4</sub>-N < 5 mg/L** at **10-15 °C** Sewage temperature.

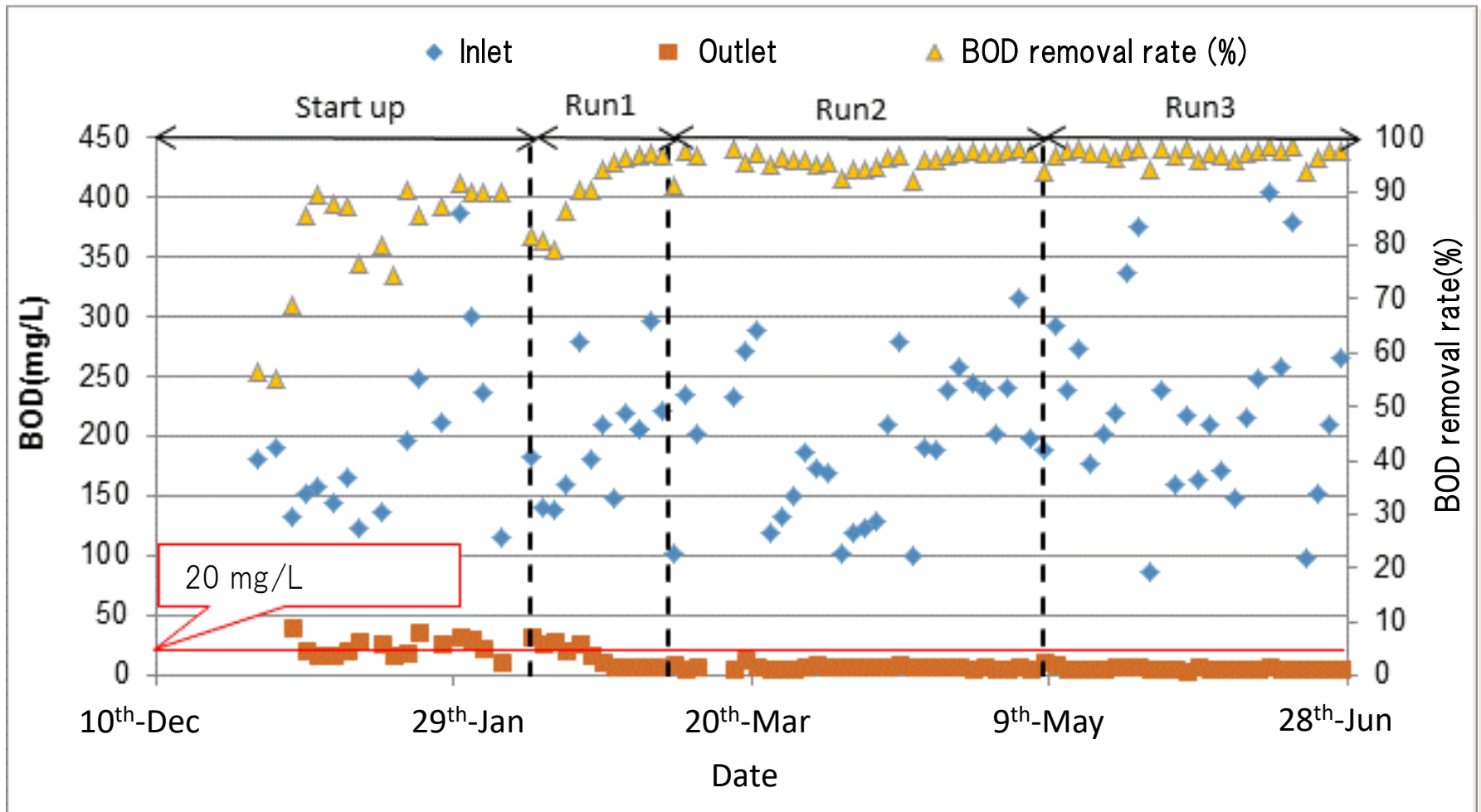
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● BOD of outlet water is less than 20 mg/L (Regulation).

Run1 : No Bypass

Run2 : Aeration tank HRT 2hr

Run3 : Aeration tank HRT 1 hr



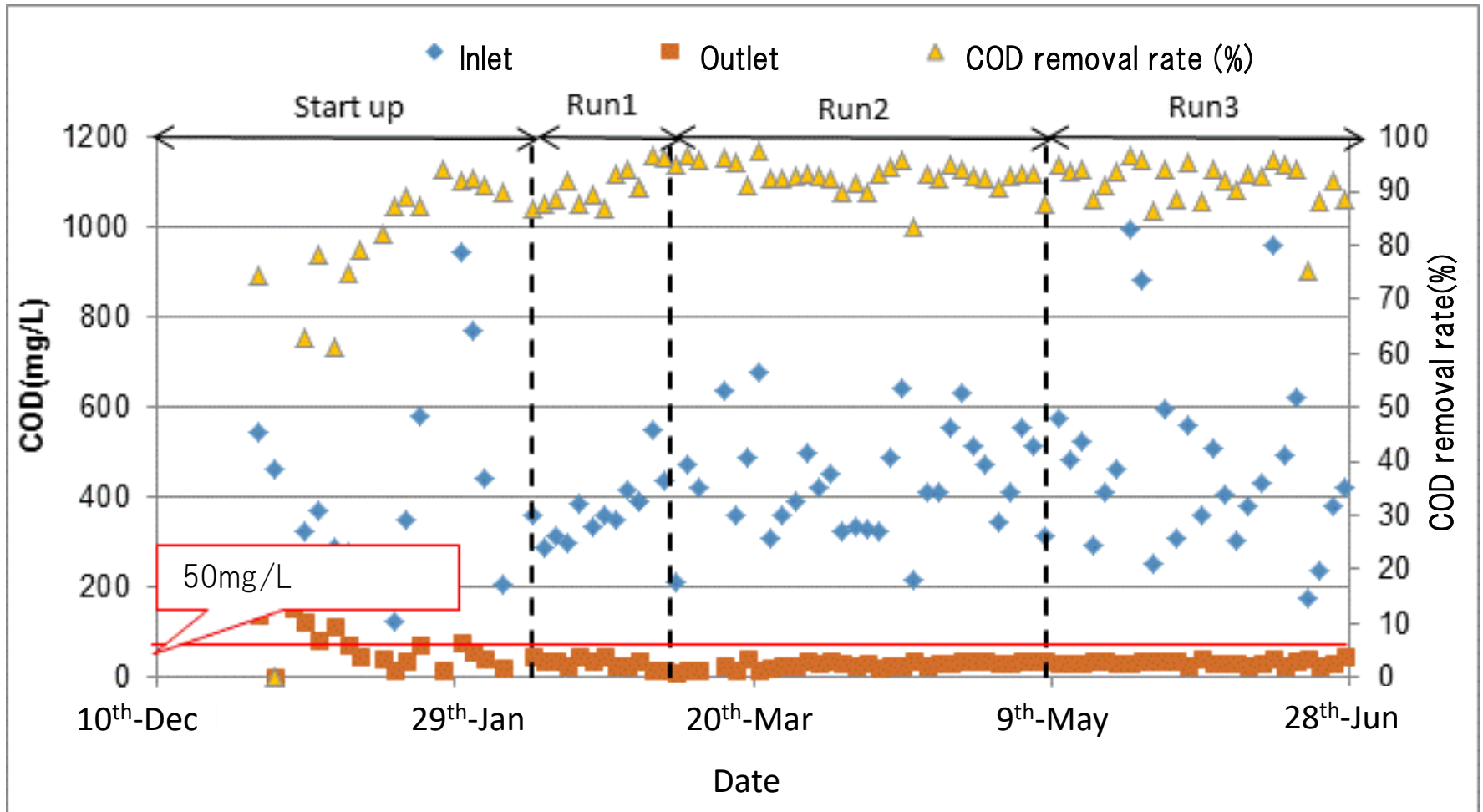
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● COD of outlet water is less than 50 mg/L (Regulation).

Run1 : No Bypass

Run2 : Aeration tank HRT 2hr

Run3 : Aeration tank HRT 1 hr



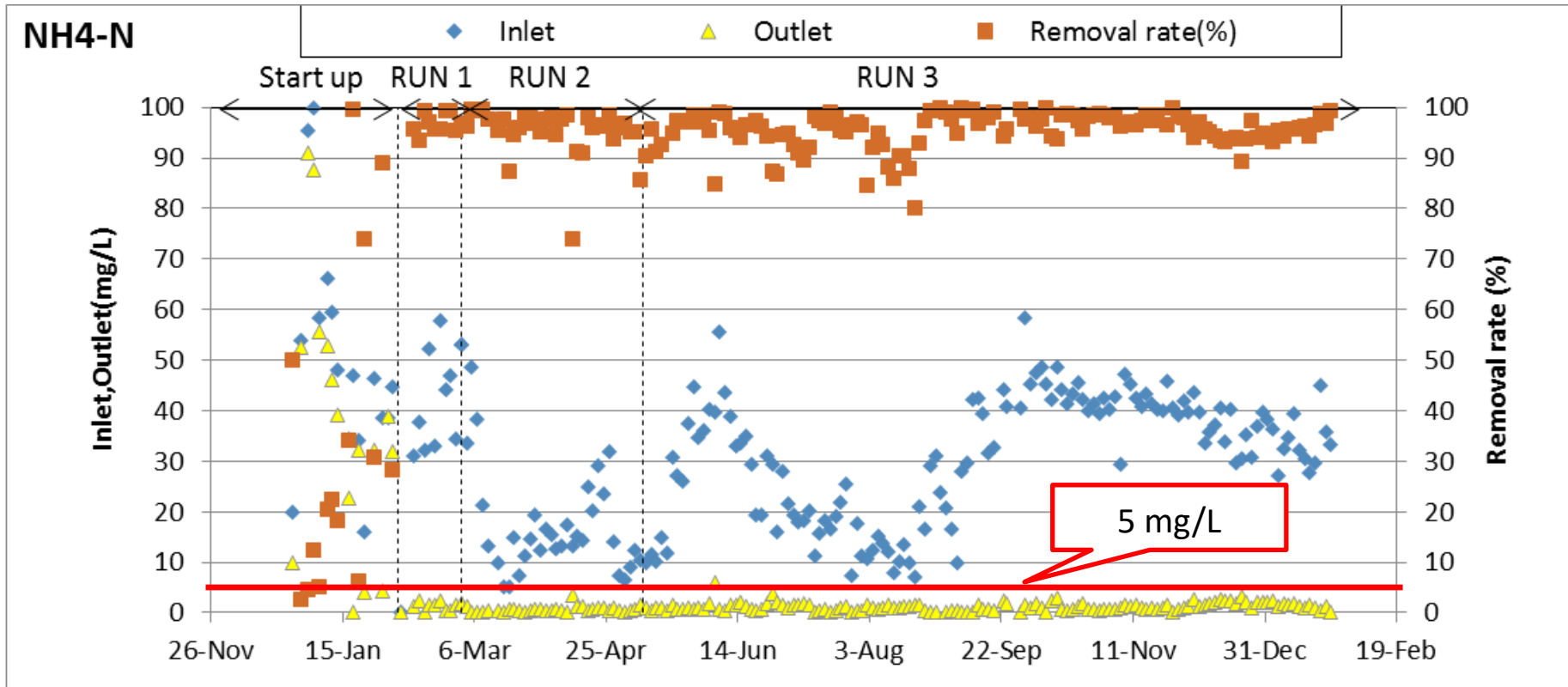
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● NH4-N of outlet water is less than 5 mg/L (Regulation).

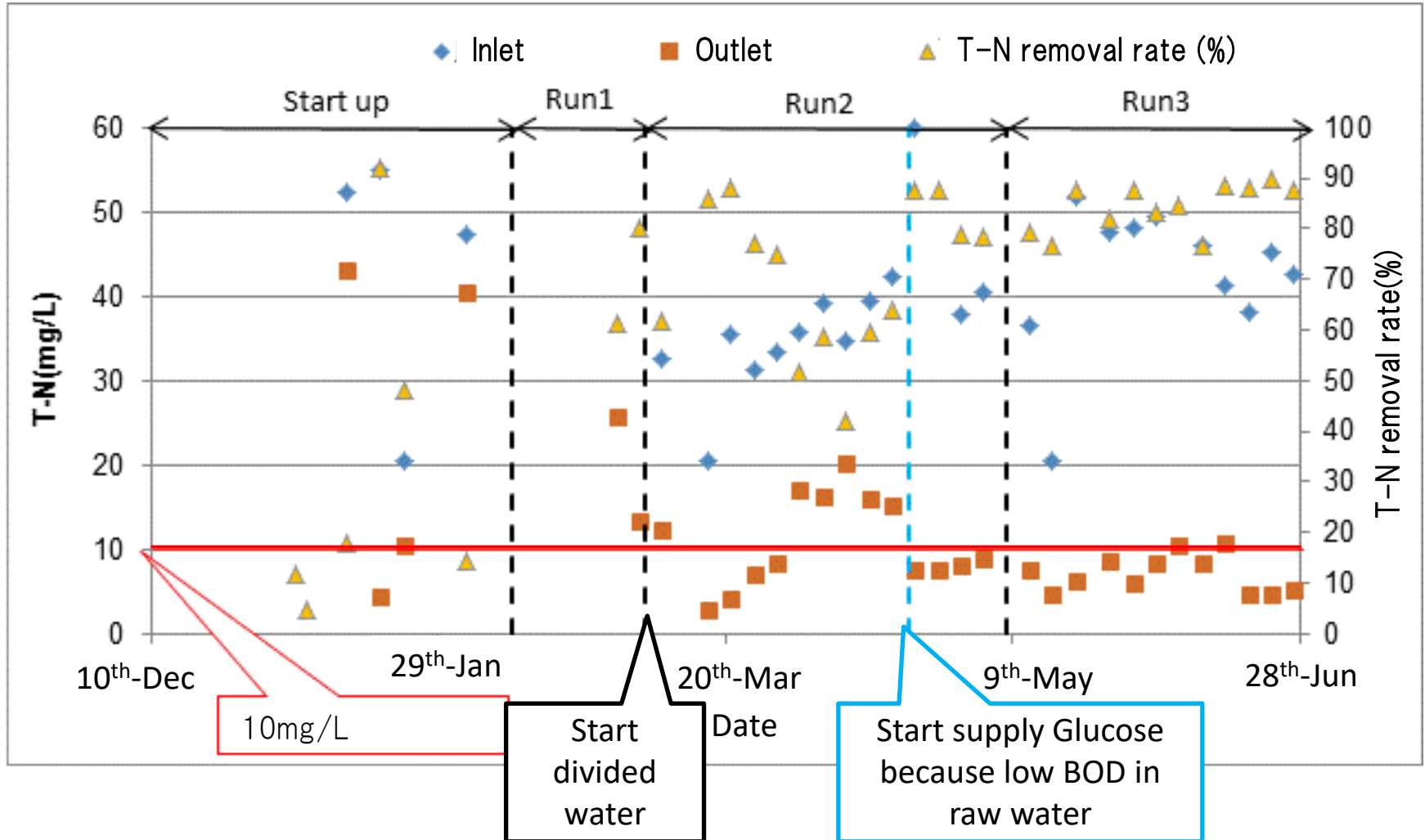
Run 1 : No Bypass

Run 2 : Aeration tank HRT 2hr

Run 3 : Aeration tank HRT 1 hr



● NH<sub>4</sub>-N of outlet water is less than 10 mg/L (Regulation).

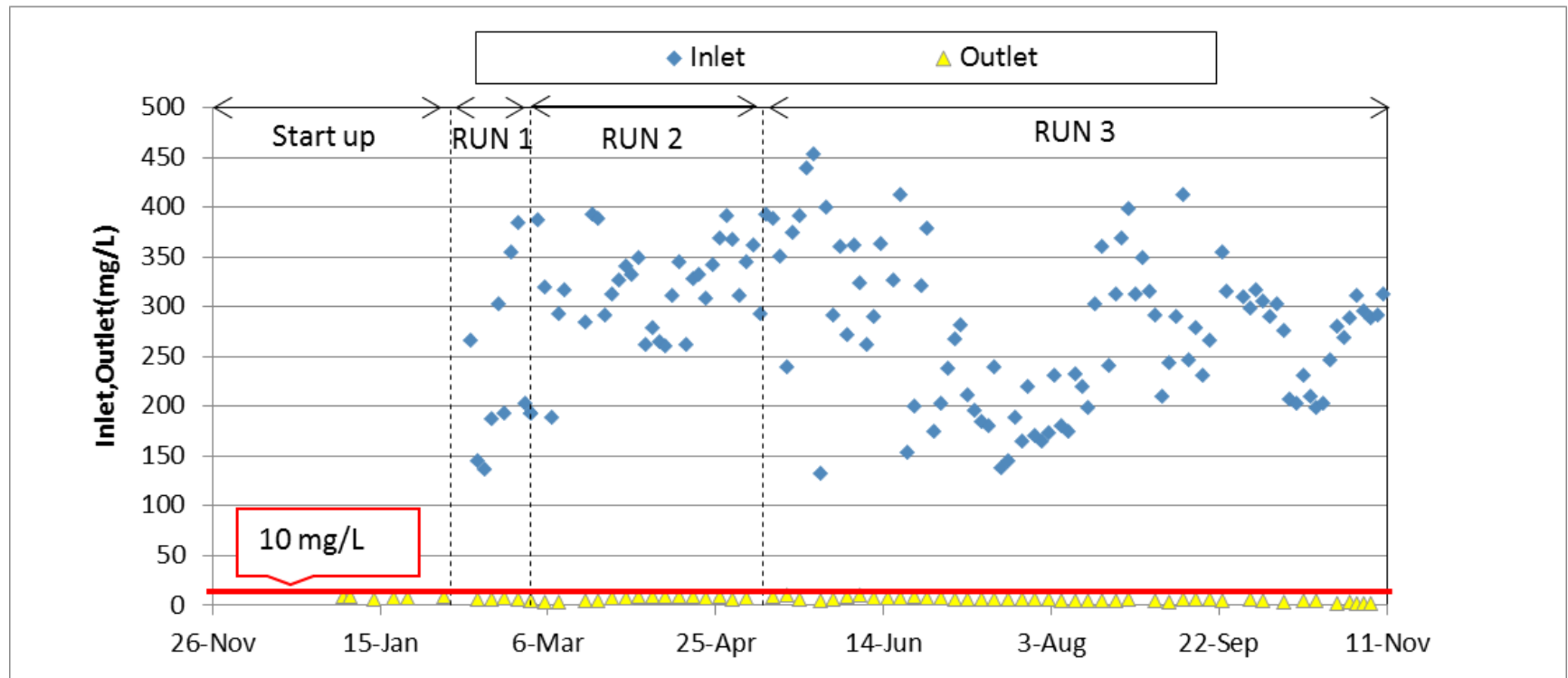




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- SS of outlet water is less than 10 mg/L (Regulation).

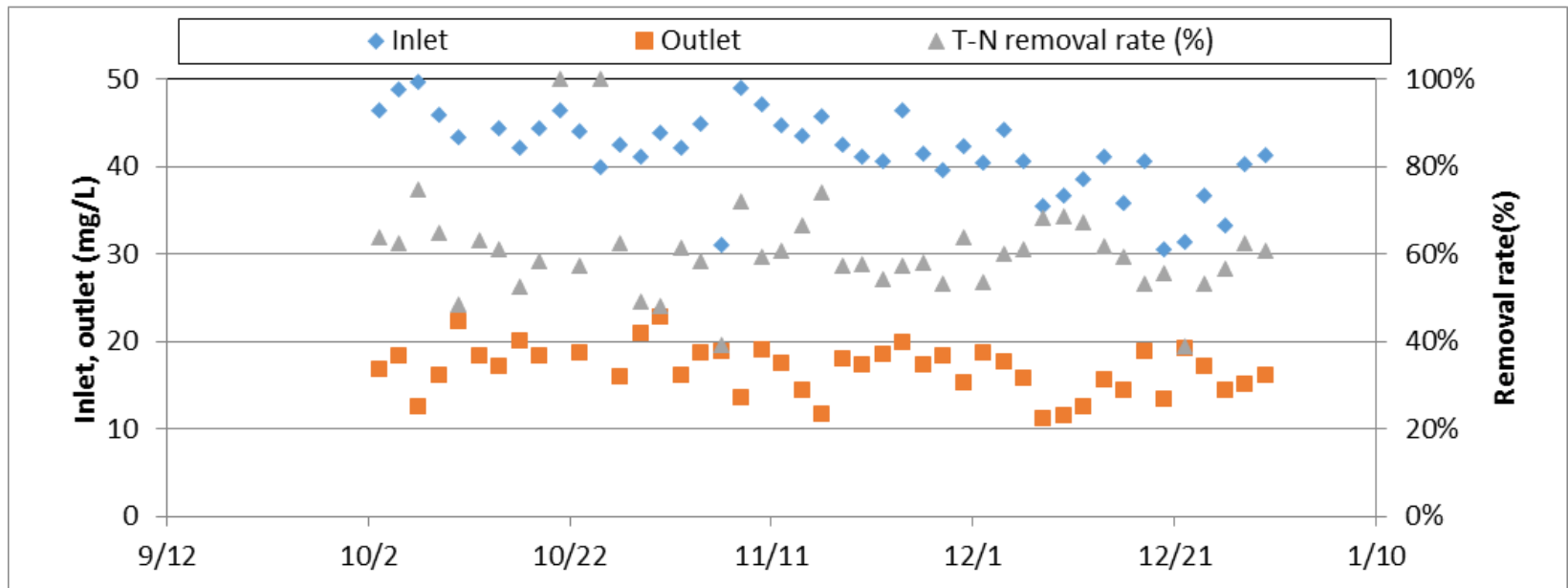
Run1 : No Bypass  
Run2 : Aeration tank HRT 2hr  
Run3 : Aeration tank HRT 1 hr



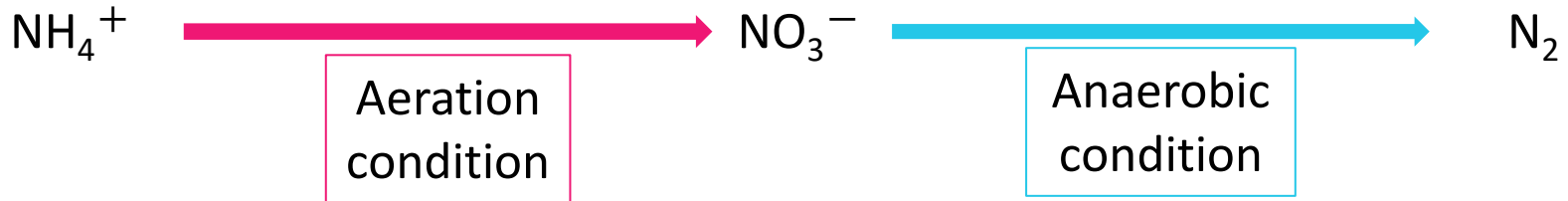
# The reason of high performance to sewage ①

● At PVA Gel tank, T-N removal rate is about 60 %

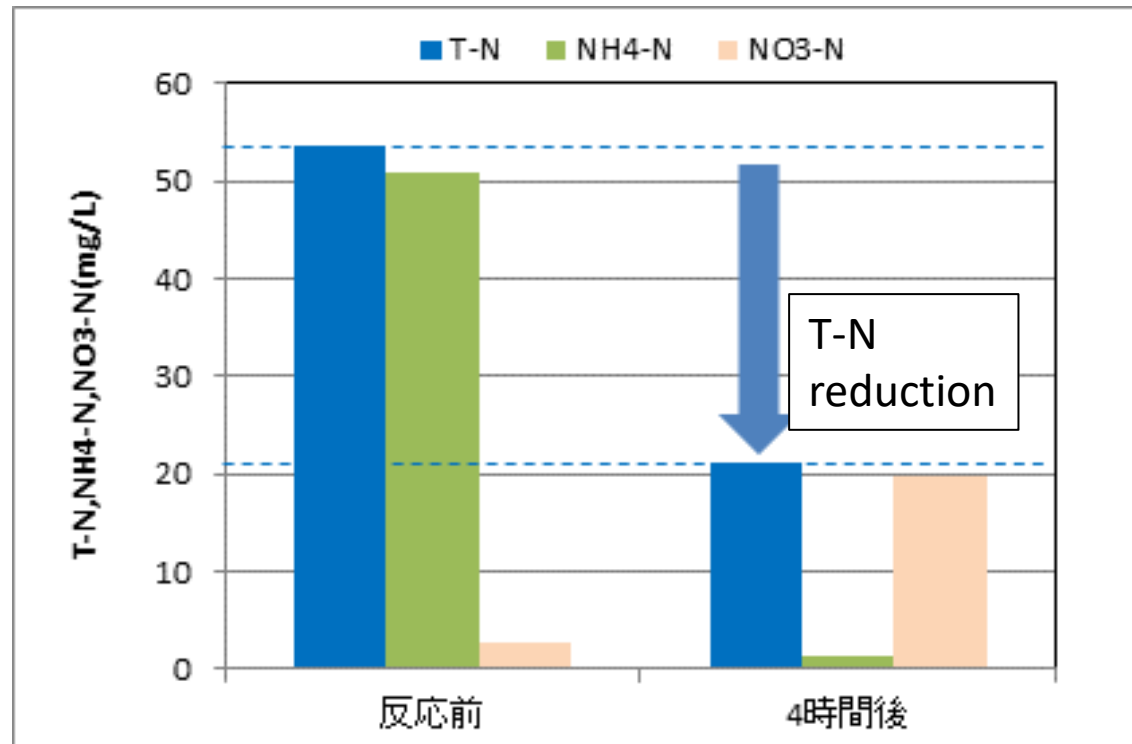
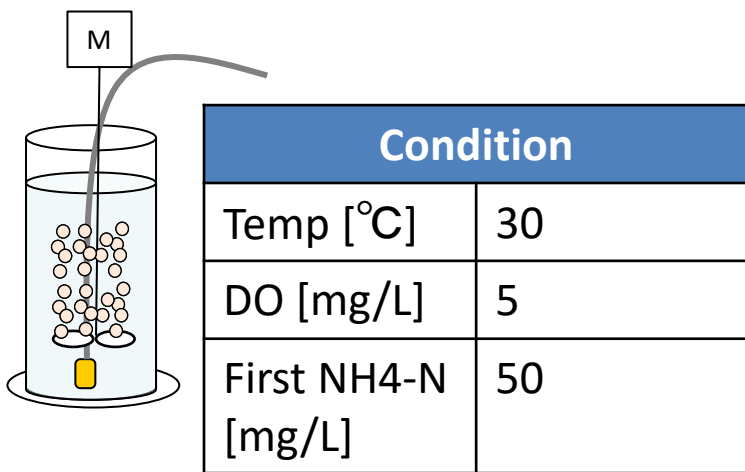
⇒ Simultaneous nitrification-denitrification occur in the PVA Gel tank.



## N removal



## Confirmation of Simultaneous nitrification-denitrification by batch test

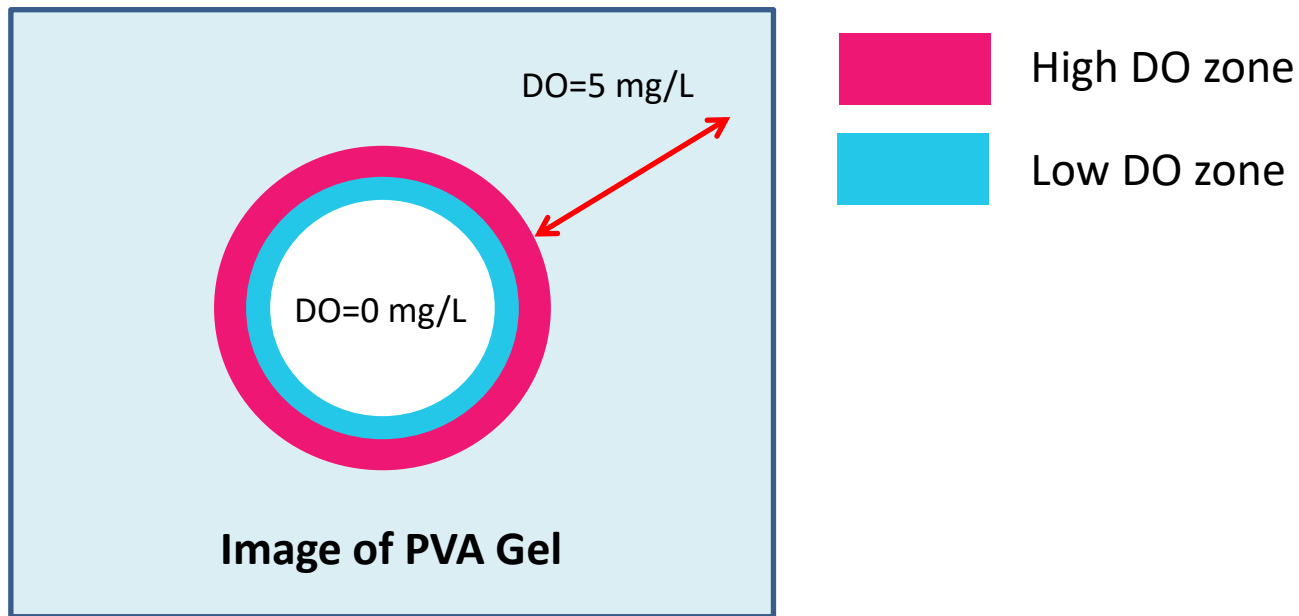


Under aeration condition, part of N removal occurred.

## The reason why simultaneous nitrification-denitrification by batch test (Estimation)

Near surface of PVA Gel is high DO zone, inside of PVA Gel is low DO zone.

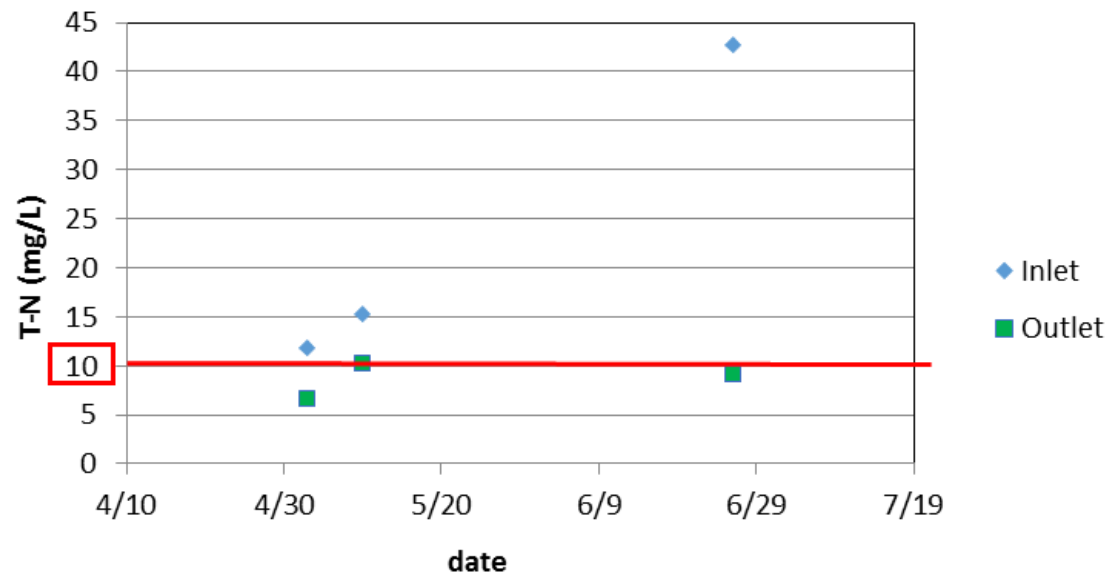
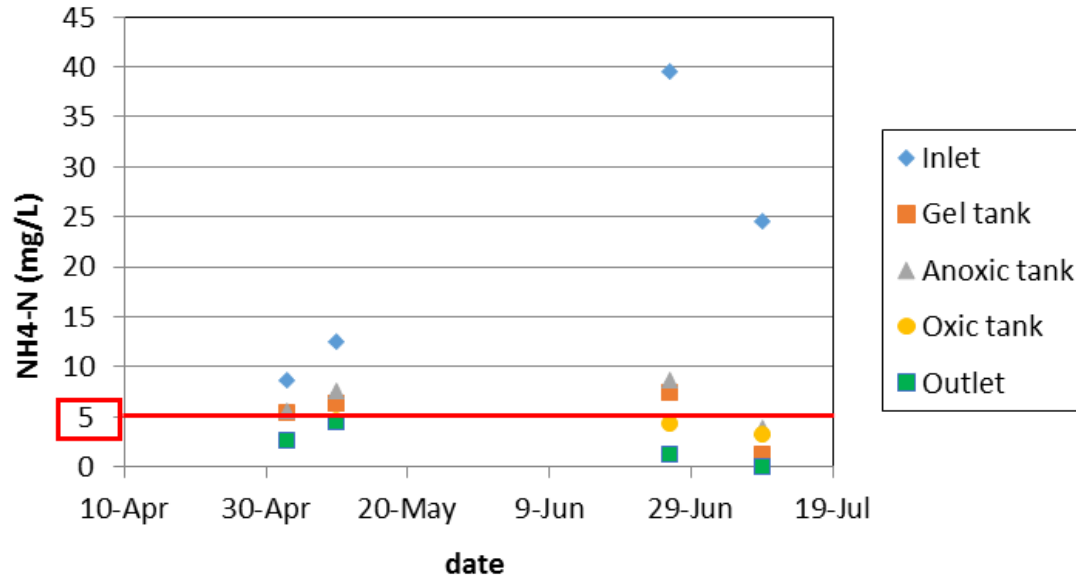
Near surface of PVA Gel is Nitrification condition, inside of PVA Gel is Denitrification Condition. So we think part of N removal occur.





- From May 2018, operation of STP was started.
- Now we are designing 3500, 7500 CMD STP.

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Concentration of outlet water is less than regulation