

CASE STUDY

Application of CHALK

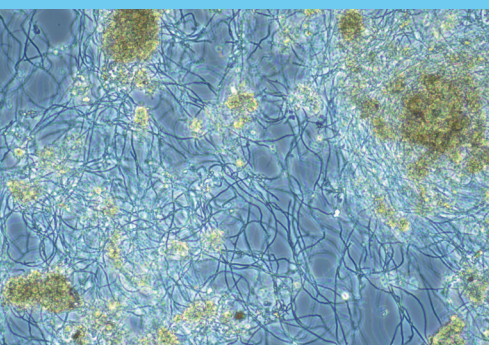
for the optimization of an overloaded sewage treatment plant

KEY DATA OF THE APPLICATION

Municipal wastewater treatment plant
with large indirect dischargers
(vegetable processing)

Capacity:
144.000 PT

Degree of capacity utilization:
81% in annual average
(up to 145% in monthly average)



High SVI due to
high filament index (*Nostocoida limicola*)

INITIAL SITUATION

Municipal wastewater treatment plant with a large inflow from the food industry (vegetable processors), conventional plant with primary clarification, activated sludge, secondary clarification and digestion.

Strong load fluctuations due to indirect dischargers, very high BOD₅-concentrations and loads during harvest season.

In winter 2021/2022, the system was severely overloaded, leading to a massive increase in filamentous bacteria. Simultaneously, the calculated sludge volume increased up to >3000 mL/L and the sludge index was at 500 mL/g. The visibility in the secondary clarifier decreased below 50 cm.

Due to an insufficient nitrification, the nitrogen concentration (mainly ammonium) strongly increased in the outlet.

TASKS

- Reduction in sludge volume and SVI
- Improvement of the sedimentation in the secondary clarifier
- Reduction of the filament index
- Improvement of nitrification

APPROACH

The result of the **microscopical examination** showed a lack of sufficient floc formation in the activated sludge. Filamentous bacteria (especially *Nostocoida limicola*) dominated, which were responsible for the poor sedimentation.

By the **analyses of operational parameters**, discussions with the operating staff and our own measurements, we were able to identify the main causes for the deteriorated operating conditions: the high biomass in the activated sludge and the high salt loads.

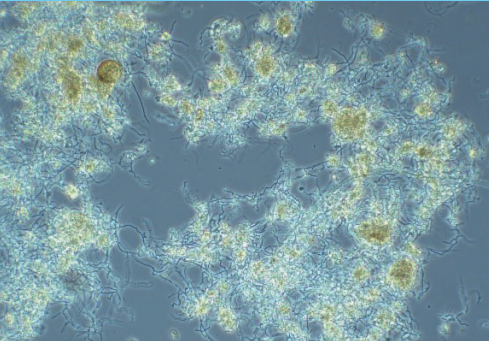
In April 2022, we started the dosage of **BIOFLOC® OPTIMIZER** and the chalk product **NITRIFLOC® Aktiv**:

- Shock dosing of **BIOFLOC® OPTIMIZER** to quickly stabilize the flocculation and improve the settling speed
- Dosing of **NITRIFLOC® Aktiv** (20 g/m³ Q_r) for a long-term improvement in floc formation and nitrification performance
- Adjustment of the sludge age to the actual sludge load

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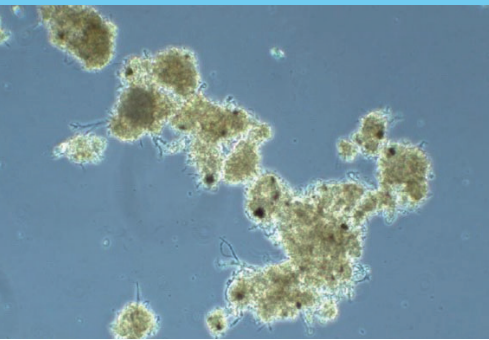
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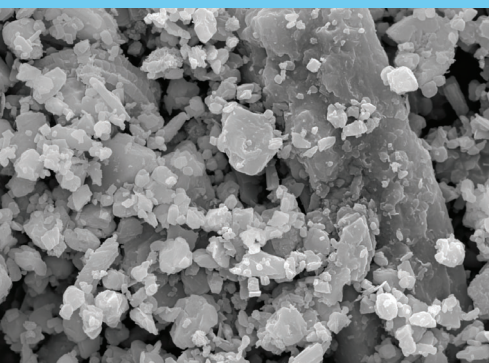
BEFORE April 2022

filament index 4 (*Nostocoida limicola*)
only very few floc cores



AFTER October 2022

filament index 0 - 1 (*Nostocoida limicola*)
very stable flocs with compact cores



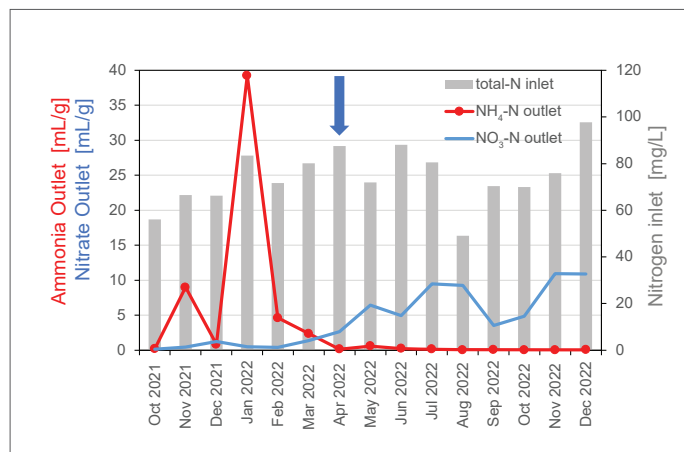
NITRIFLOC® Aktiv

SEM-picture of the chalk product
(Foto: IGAS research, Goslar)

RESULT

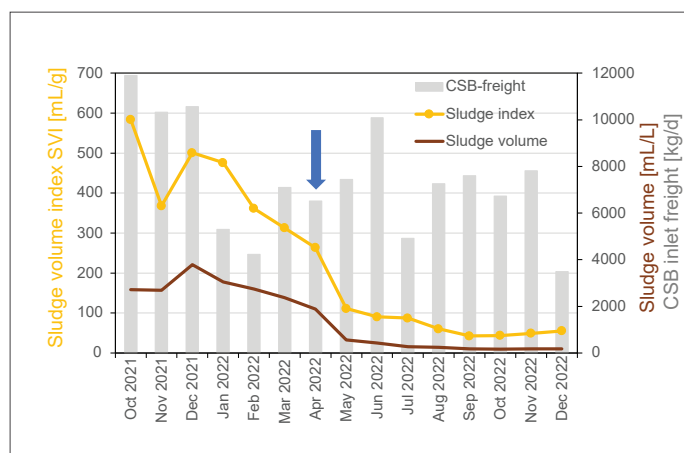
Rapid improvement of floc structure and reduction of filamentous bacteria. Already in May, many flocs had developed compact cores and the filament index had decreased significantly. The ammonium concentration in the effluent had also fallen below 1 mg/L. From June, the sludge volume was steadily below 300 mL/L and the sludge index stabilized below 100 mL/g.

- low filament index (*Nostocoida limicola* almost disappeared, only filaments not relevant to SVI present)
- compact and rounded flocs
- optimal oxygen supply
- stable nitrification, very low ammonia values in the effluent



Development of nitrogen parameters in inlet and outlet (monthly averages)
in the observation period Oct 2021 - Dec 2022.

The blue arrow marks the application start of **NITRIFLOC® Aktiv**



Development of sludge volume and ISV (monthly averages)
in the observation period Oct 2021 - Dec 2022.

The blue arrow marks the application start of **NITRIFLOC® Aktiv**