Water & Waste Management

BioRemove™ AM

General Industry

Case study: Reduces effluent ammonia by 97.5%

Rethink Tomorrow

novozymes®

The application of BioRemove™ AM to an activated sludge plant brought the facility into compliance to meet effluent quality standards.

Benefits

- **Improved plant efficiency by reducing effluent ammonia by 97.5%**
- **Simplified operations by providing an easy to use solution**

Background

A chemical plant operates a 7,600 m3/d (2.0 MGD) activated sludge plant designed for nitrogen removal. The influent ammonia (NH4-N) concentration of the plant ranges from 200-800 ppm. Effluent organic removal and a 30 day sludge age normally support a healthy nitrifying bacterial population. Nitrate (NO3-N) removal occurs anoxically in a basin where the return sludge and a portion of the mixed liquor circulate.

Following a plant upset, effluent NH4-N levels surpassed 400 ppm causing acute non-compliance with the discharge permit. Novozymes was contacted to determine if seeding with BioRemove™ AM could re-establish nitrification.

Application

A recommendation to seed the aeration basin with Novozymes nitrifiers and raise the basin pH and alkalinity with caustic soda was implemented. Although the basin pH was not responsible for the loss of nitrification, a low basin pH of 6.1-6.5 could have hindered the recovery process. At that pH, it was evident that the alkalinity may not have been sufficient to prevent a nitrate-induced reduction in pH that occurs when nitrification is established. Since nitrification requires a theoretical 7.14 ppm of alkalinity per ppm of NH4-N oxidized to NO3-N, a re-start could easily drop the pH to below 6.0 and completely inhibit a full recovery.

Results

BioRemove™ AM was added to the aeration basin over a ten day period, in addition to raising the mixed liquor pH to 7.7. During this period, the effluent NH4-N decreased by 97.5%, from 397 to 10 ppm.

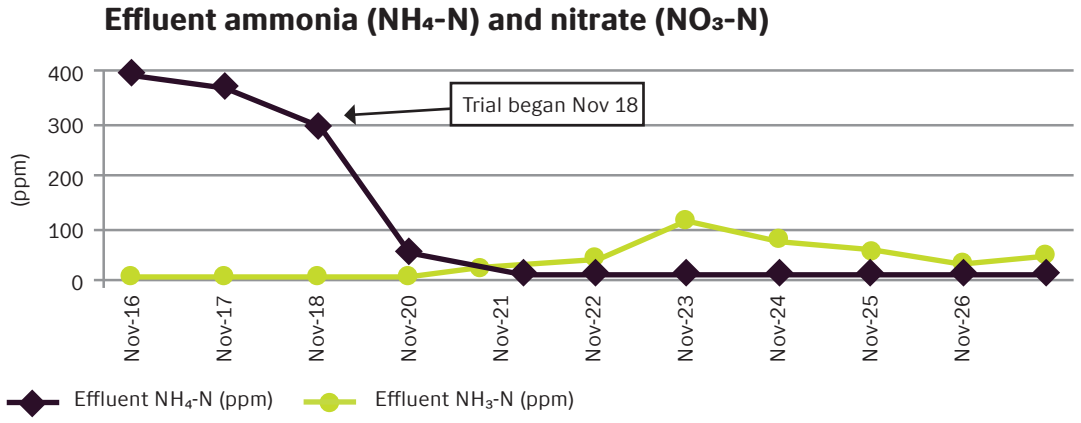

Fig. 1. Effluent ammonia (NH_4-N) and nitrate (NO_3-N)

At the same time, effluent NO3-N increased from 0 to a peak of 135 ppm, then back down to 101 ppm as the denitrification rate responded to increased NO3-N production. The mixed liquor pH was gradually allowed to drop to the 6.5-7.0 range that had historically supported nitrification, thereby eliminating the need for continuous caustic addition.

Conclusion

Novozymes' biological program was easy to implement and provided significant benefits over other alternatives. BioRemove™ AM resulted in:

- **Lower operating costs**
- **Improved plant efficiency**
- **Simplified operations**

About Novozymes
Novozymes is the world leader in biological solutions. Together with customers, partners and the global community, we improve industrial performance while preserving the planet's resources and helping to build better lives. As the world's largest provider of enzyme and microbial technologies, our bioinnovation enables higher agricultural yields, low-temperature washing, energy-efficient production, renewable fuel and many other benefits that we rely on today and in the future. We call it Rethink Tomorrow.

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