

CASE STUDY # 095

Reactivation of the nitrification in a landfill leachate treatment plant

SUBJECT:

Reactivation of the nitrification process in a landfill leachate treatment plant after nitrification activity loss during the winter period.

PRODUCT APPLIED:

MICROCAT-XNL Ammonia Oxidizing Bioformula

DESCRIPTION

A landfill site used for storing household waste in Germany experienced problems with maintaining nitrification during a winter period. The site has been in use as a landfill site for decades and leachate is treated since 20 years in a percolation wastewater treatment plant. The treatment system is a 3 phase treatment. The first step is a biological step to reduce COD and nitrogen levels. The biological step is followed by a physico-chemical step to further reduce COD through precipitation and the 3rd and final step is filtration in an activated carbon filter for COD reduction. Sludges from the process are dewatered and fed back into the landfill.

The treatment plant is overall very heavily loaded. Both the waste strength and the hydraulic flow is significantly higher than the original design of the sewage plant. Also, the conductivity (chloride content) is very high. Despite the current unfavorable starting conditions the treatment performance of the biological stage is very good. The COD reduction is about 45 to 50% and NH₄-N removal over 99%. Except a carbon source for denitrification and low amounts of sodium hydroxide for pH adjustment in biological section no chemicals are added.



PROBLEM

In early December 2010 the nitrification performance decreased significantly, the cause for the decrease could not be determined. About a week after the start of the nitrification deterioration it came to a complete standstill. The COD removal decreased from 50% to 35%. To increase the COD degradation and to reactivate the nitrification various measures were introduced (increased aeration, flow reduction, pH reduction, carbon allowances), which remained, however, all without success.

TREATMENT PROGRAM

Due to the poor treatment performance of the biological stage the subsequent stages needed significant additional amounts of coagulants and activated carbon. It was therefore decided to use our Microcat ® XNL to accelerate the reactivation of nitrification in the biological stage.

The Microcat® addition started on Monday January 10, 2011. The following treatment program was implemented.

Days 1&2: 7,5 Liters/day
Days 3-10: 1,5 Liters/day
Days 11-20: 0,75 Liters/day

Part of the treatment program was a reduction of the pH to a range of 7 – 7,5. Even though the necessary hydrochloric acid for the pH reduction was not available at the time of treatment the dosing of Microcat XNL proceeded as planned.

RESULTS

After 7 days of dosing the first NH₄-N removal could be observed. After 15 days of treatment the NH₄-N removal was again above 99%.



CONCLUSION

The nitrification of this leachate treatment plant didn't recover after its collapse for several weeks, despite all the process operational measure which were taken. Within 2 weeks after the start of dosing Microcat-XNL the nitrification was back at its original level of 99%. Microcat-XNL achieved this recovery despite the unfavorable conditions for nitrification, high chlorine levels and high pH and therefore unfavorable dissociation of Ammonium - Ammonia in the direction of ammonia (inhibition of Nitrobacter and Nitrosomonas).