

Case Study

COMPREHENSIVE RECOVERY APPROACH HELPS CHEMICAL FACILITY REGAIN NITRIFICATION AND AVOID A POTENTIAL AMMONIA PERMIT EXCEEDANCE

Problem

A chemical intermediates facility in the southeast U.S. operating a biological nitrogen removal (BNR) wastewater treatment system experienced an ammonia removal upset in 2020. An imbalance of substrates combined with the bioaccumulation of inhibitory compounds created a weakened or stressed biomass. As a result, the treatment system lacked the resiliency to cope with the toxic and/or inhibitory episodes, which had previously been handled without incident. In the month leading up to the deterioration of wastewater system performance, higher than normal upstream product losses set the stage for nitrification loss.

Methodology

Utilizing advanced instrumental analyses and vast experiential knowledge, the EBS laboratories diagnosed a chronic inhibition problem with the biomass. Since nitrifiers are preferentially fixed film growers, they depend on a healthy heterotrophic bacteria population to both reduce the inhibitory compounds and provide a floc structure upon which to grow. The heterotrophic biomass in this case was not providing an acceptable environment for the nitrifiers to grow.

EBS worked with the client to improve the environmental conditions utilizing unique EBS products: MicroCarb™ BOD Supplement, NitriFire™ Nitrifying Formulation, and BioStar™ R Heterotrophic Bacteria Formulation. Figure 1 provides a timeline of the upset recovery.

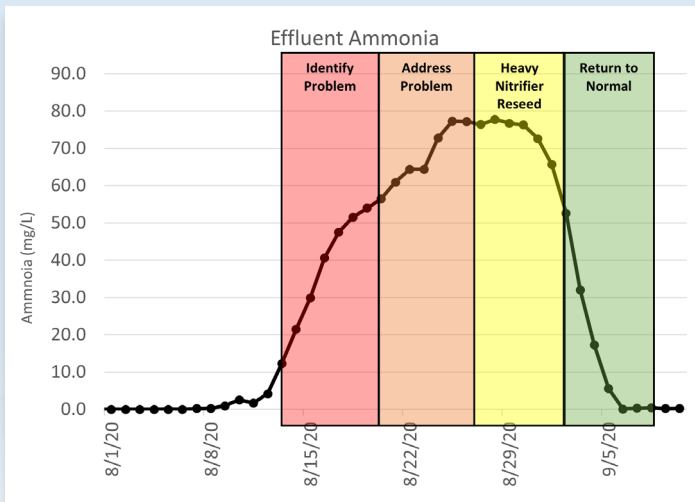


Figure 1

The initial two phases consisted of robust testing methodologies from both the chemical facility's laboratory and the EBS Advanced Analytical Lab. In phase three, product addition commenced with frequent monitoring to ensure the system returned to normal.



The EBS Response and Results

EBS was contacted on the first day the ammonia doubled above the facility's process control target range. Once it was determined that chronic toxicity was the likely root cause, a plan was developed that consisted of wasting sludge coated in toxic compounds and growing new sludge at an accelerated rate. To achieve this goal, EBS supplied MicroCarb, a clean food source for the bacteria, along with BioStar R bacteria grown in the EBS Bacterial Acceleration Chamber (BAC unit) to create new sludge, increase the MLSS, and reduce the impact of the toxic/inhibitory compounds that had accumulated on the biomass. As the MLSS increased, additional advanced analytical testing was conducted to monitor the concentrations of identified chemicals of concern causing the toxicity.

After a few days of this program, a final advanced chemical screening was performed whose result provided the green light to reseed the system with

The EBS Response and Results continued

NitriFire, a concentrated blend of *Nitrosomonas* and *Nitrobacter* nitrifying bacteria. The healthier heterotrophic population provided an ideal environment for the nitrifiers to thrive and reestablish biological ammonia removal.

In the reseed phase, NitriFire was applied at a dose of one pound of product for every 8-10 pounds of ammonia to be removed for four days. Within two weeks, the nitrifying bacterial population was reestablished and ammonia concentrations returned to normal with a 50% reduction in ammonia seen by day seven.



Overall Benefits

- The facility did not record an ammonia violation.
- There was no interruption or delay in facility production.
- The facility uncovered the need for a permanent, engineering solution to remediate equalization deficiencies.
- EBS and the client documented recommendations to mitigate impacts of future upsets similar in nature.
- Utilizing a combination of onsite review and advanced analytical testing provided important information on root causes which led to a successful program application.

Additional Technical Support

We are recognized as experts in identifying and troubleshooting nitrification problems in activated sludge systems, particularly in petrochemical plants, oil refineries, and meat/poultry processing facilities. EBS capabilities include data review and on-site troubleshooting to provide a comprehensive approach to wastewater treatment optimization.

The EBS Microbiology lab can monitor the biological health of your system over time via microscopic exams and flow cytometry to assess total and live bacterial cell counts. The EBS Advanced Analytical Lab employs state-of-the-art instrumental techniques to analyze for over 100 organic and inorganic compounds known or suspected of being toxic or inhibitory to nitrification. These value-added services, in conjunction with our product offerings, create a unique value proposition for clients while ensuring that product application provide maximum impact and cost effectiveness.

**To learn more about EBS
biological programs, contact EBS at
(985) 674-0660 or at info@ebsbiowizard.com.**

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