

# Case Study

## CHEMICAL FACILITY RECOVERS NITRIFICATION AND PREVENTS AN AMMONIA VIOLATION USING A UNIQUE EBS PROGRAM

### Problem

A chemical intermediates facility in the southeast U.S. that operates a biological nitrogen removal wastewater treatment plant 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 was unable to cope with the toxic and/or inhibitory episodes as it previously had. In the month leading up to the deterioration of wastewater system performance, upstream product losses increased setting the stage for nitrification loss.

### Methodology

Utilizing GC and HPLC methods and vast experiential knowledge, the EBS Advanced Analytical Lab diagnosed a chronic inhibition problem with the biomass. Inhibitory conditions within the biomass can cause significant issues for nutrient removal facilities. 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 required to support a healthy biomass utilizing three key EBS products: MicroCarb™ BOD Supplement, NitriFire™ 5X Nitrifying Bacteria Formulation, and BioStar™ R Bacterial Formulation. Figure 1 provides a timeline of the upset and the different phases through which the problem was solved. The initial two phases consisted of robust testing methodologies from both the chemical facility's laboratory and the Advanced Analytical Lab. In phase three, product addition commenced with frequent monitoring to ensure the system returned to normal.

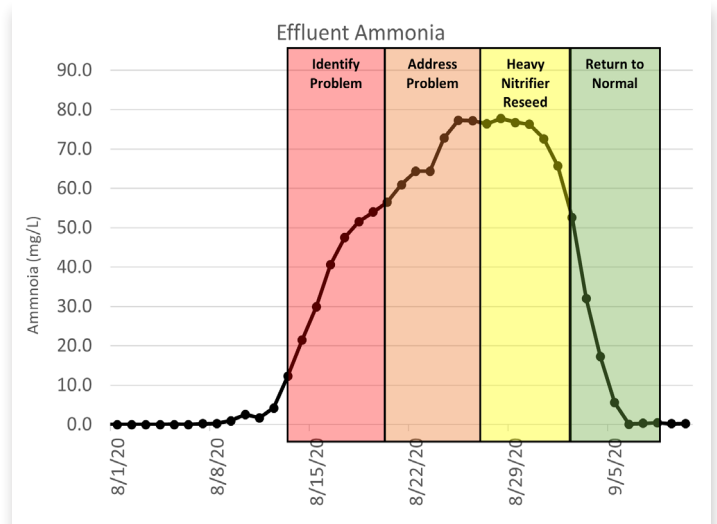


Figure 1

### Background Action

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 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 (or BAC unit) to create new sludge, increase the MLSS, and reduce the impact of the toxic/inhibitory compounds that had



## Background Action continued

accumulated on the biomass. As the MLSS increased, 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 done whose result provided the green light to reseed the system with NiriFire 5X, a live, concentrated blend of Nitrosomonas and Nitrobacter nitrifying bacteria. The healthier heterotrophic population provided an ideal environment for the nitrifiers to thrive and resume biological ammonia removal.

In the reseed phase, NiriFire 5X was applied at a dose of 8-10 lbs. product per pound of ammonia to be removed for 3-4 days. In the days following the nitrifier reseed effort, ammonia residuals leaving the nitrification basin decreased by 50% per day, indicating strong nitrification recovery. Within a week of the nitrifier reseed effort, the facility was back to normal operation and has not experienced new nitrification upsets.

### Program Results and 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.



**To learn more about EBS biological programs, please contact us at (985) 674-0660 or at [info@ebsbiowizard.com](mailto:info@ebsbiowizard.com) today.**

Environmental Business Specialists, LLC  
1930 Surgi Drive, Mandeville, LA 70448  
[www.ebsbiowizard.com](http://www.ebsbiowizard.com)  
[info@ebsbiowizard.com](mailto:info@ebsbiowizard.com) • (985) 674-0660

**EBS**  
ENVIRONMENTAL  
BUSINESS SPECIALISTS, LLC