

### INTRODUCTION

Blue Earth Products® is the leader in innovative approaches to water quality standards. Our suite of products reduces chlorine demand and disinfection by-products (DBPs) in water systems by eliminating organic and inorganic scale, enabling utilities to comply with EPA Stage 2 DBP rules.

Many municipal water suppliers have changed from free chlorine to chloramine disinfection in order to reduce the formation of trihalomethanes (TTHMs) and haloacetic acids (HAA5s), as well as maintain a sufficient disinfectant residual throughout the distribution system. However, chloramine systems can promote the growth of nitrifying biofilms, and tanks with poor water turnover are especially susceptible to nitrification. Regular free chlorine burn-outs are effective at killing most of the nitrifying bacteria but do not physically remove the slime and scale from the tank surfaces. Thus, nitrifying biofilms regrow rapidly. Burnout chlorination can also lead to temporary accumulation of high TTHM and HAA5 levels.

In 2007 Blue Earth Products' Top Ultra tank cleaning chemistry was used by a Missouri water system that was experiencing nitrification problems in a particular tank. This reservoir is a 500,000-gallon, glass-lined tank with a history of significant nitrification. The tank was taken off-line for nine days to determine baseline levels for nitrite, nitrate and total chlorine. The tank was emptied, cleaned with Top Ultra, filled with water, and again taken off-line to determine post cleaning nitrification levels.

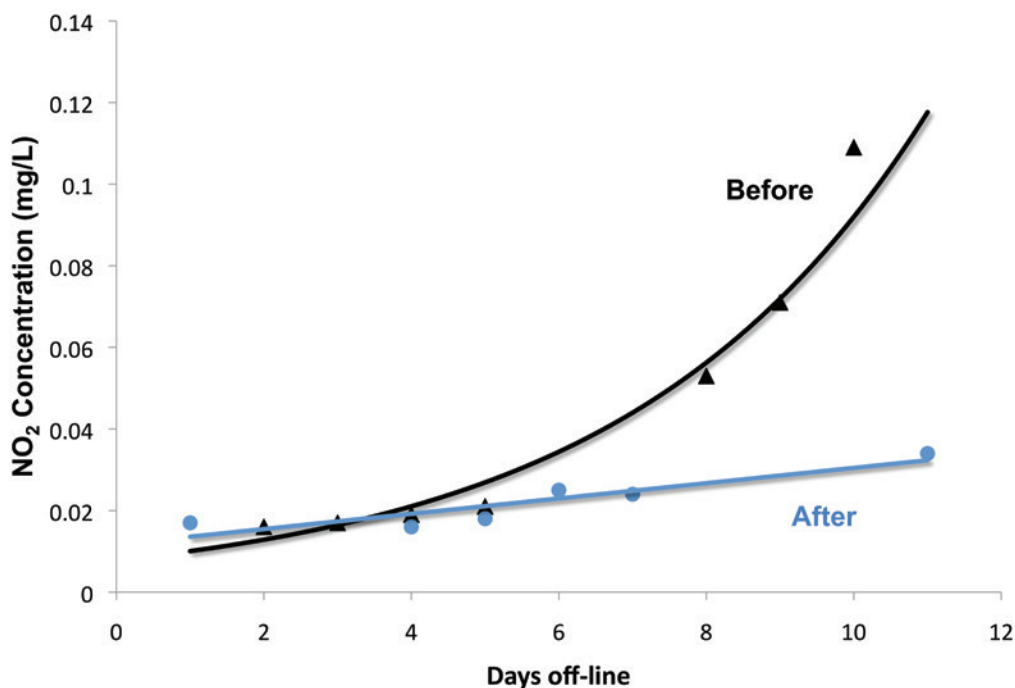


Figure 1 - Nitrite concentrations before and after Top Ultra tank cleaning

### RESULTS

Prior to Top Ultra cleaning, nitrite levels in the tank increased significantly after only 5 days off-line (from 0.016 mg/L on day 2 to 0.109 mg/L on day 10 – see Figure 1). On day 10, the off-line period was terminated since the nitrite levels were approaching the maximum allowable level. After the cleaning process, the nitrite levels remained relatively low throughout an 11-day period, increasing to 0.34 mg/L on day 11.

Only minor changes in nitrate levels were observed during both off-line periods. However, the average nitrate concentration in the tank was 1.8 mg/L before cleaning and 1.18 mg/L after cleaning. This reduction was consistent throughout the off-line periods.

Nitrification is often accompanied by a decline in total chlorine residual, due to biofilm growth. Figure 2 shows the total chlorine concentrations over the course of both off-line periods. Prior to the cleaning, the residual dropped by 0.7 mg/L over 9 days; after the cleaning, the reduction was only 0.2 mg/L over 11 days.

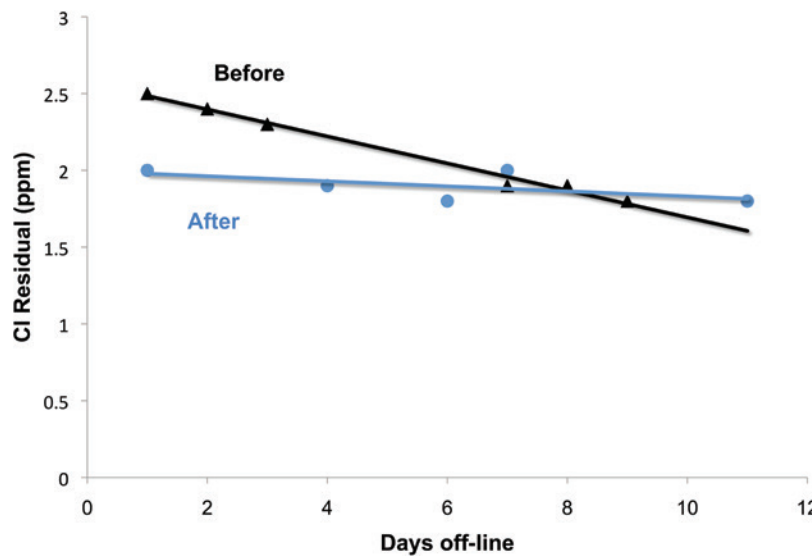


Figure 2 - Total chlorine residuals during both off-line periods

### DISCUSSION

In this field trial, Blue Earth Products' Top Ultra was very effective at cleaning the tank in question. The tank was cleaned in a single day and the visible deposits from the interior tank surfaces were completely removed. Additionally, as seen from the data above, the procedure resulted in significant reduction of nitrification and chlorine demand.

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