

DENITRIFICATION

Enhanced Nutrient Removal (ENR)

Blue Water Technologies, Inc. is the industry leader in the development of technologies for nutrient removal from wastewater. With advanced equipment design, Blue Water offers the Blue NITE™ treatment system for consistently lowering nitrates to <1 mg/L $\text{NO}_3\text{-N}$. Using Blue NITE™'s proprietary control system, coupled with new applications of alternative carbon sources, Blue Water provides the most efficient and economically viable treatment solution.

In the Blue NITE™ process, biological activity in the tertiary filtration system converts nitrates to nitrogen gas. Using our unique control system, Blue NITE™ maintains NPDES targets for both nitrate and biochemical oxygen demand (BOD) by accommodating high or fluctuating influent nitrate levels. In addition to installations using traditional carbon sources such as methanol, Blue Water has extensive design and installation experience with the newest alternative carbon sources. These non-explosive options can moderate the capital cost of chemical storage facilities.

Blue NITE™ can be configured for wastewater or groundwater applications. The modular filter design allows for trouble-free installation of new systems, or capacity increases to existing processes. The filters are also certified for water reuse applications and hold California Title 22 acceptance.

With over twenty years of international installation history and experience, Blue Water is a trusted and capable partner in the wastewater industry, providing economical solutions to municipal and industrial clients alike.

The Blue NITE™ advantage:

- Nitrate removal to < 1 mg/L
- Unique patented control system
- Lowest capital and O & M
- Eliminates upsets and backwash cycling
- Modular end-of-pipe solution
- Alternative carbon sources available
- Total nutrient removal capable
- California Title 22 accepted

Blue NITE™



3.5 MGD (153 L/s) Blue NITE™ in Virginia

How It Works

Blue NITE™ systems utilize Blue Water's Centra-flo™ continuous backwash, upflow sand filters. A carbon source is dosed to the wastewater influent prior to entering the sand filters. In the Blue NITE™ system, fixed-film heterotrophic bacteria convert nitrates (NO_3 and NO_2) to atmospheric nitrogen (N_2). The composition of the bacterial population depends largely on the type of carbon source dosed. Bacteria and solids wasting are facilitated by the continuous backwash of the Centra-flo™ filter. The sand washer removes solids and excess biomass, which are directed to a reject line. The clean sand then falls by gravity back to the media bed.

Design hydraulic loading rates to Blue NITE™ filters are dependent on influent nitrate levels, nitrate variability, dissolved oxygen (DO) levels, and expected range in water temperature. Loading rates can also be dictated by the NPDES permit or local regulatory agencies. Blue Water's design parameters coupled with its proprietary control system optimizes system parameters to maintain a healthy, stable biomass for denitrification.

The nitrogen gas produced during operation becomes entrapped by the filter media. This gas is carried down with the sand and is released when the filter airlift transports the sand up to the sand washer. Removal of gas in this fashion has several benefits that include: eliminating false readings in headloss, eliminating the need to backwash because of gas entrainment, and eliminating the "burp" or upset occurrences due to significant nitrogen bubble accumulation typical in static bed filters.

BLUE WATER
TECHNOLOGIES 

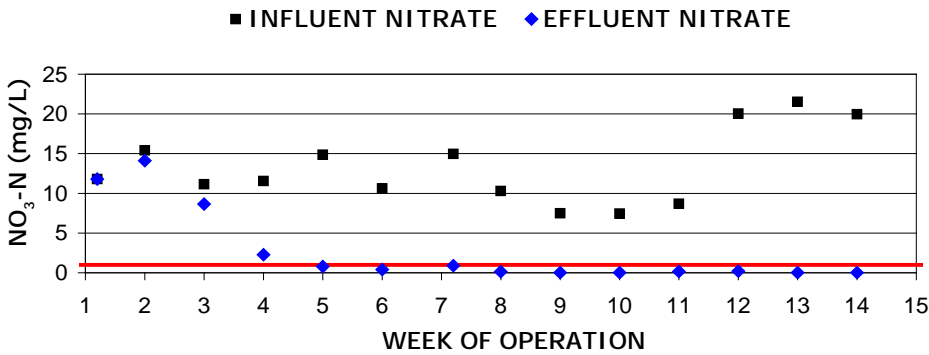
For more information, please contact **Blue Water:**
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Flexibility - Total Nutrient Removal

In ENR applications with strict NPDES discharge targets, it is often necessary to lower the concentrations of both nitrogen and phosphorus to low levels. Blue NITE™ can be easily configured to accomplish simultaneous removal of nitrogen and phosphorus in the same unit. Biological denitrification to less than 1 mg/L NO₃-N may be performed concurrently with phosphorus removal by Blue Water's Blue PRO® process, which utilizes chemical adsorption to capture 90+% of influent phosphorus. When required, additional phosphorus and solids removal may be accomplished with a second pass configuration of the Blue PRO® process.



4 MGD (175 L/s) Blue NITE™ in Pennsylvania



Results from a combined Blue NITE™ denitrification and phosphorus removal installation are shown in the chart to the left, achieving total nutrient reduction in the same vessel.

The chart shows weekly averaged Blue NITE™ results, with process startup and ongoing operation. The red line represents 1 mg/L. After startup effluent nitrate averaged 0.2 mg/L NO₃-N. Total phosphorus was lowered from an average of 5 mg/L to 0.3 mg/L.

At this installation, a second pass with Blue PRO® lowered total phosphorus concentrations <0.050 mg/L P.

INFLUENT → + CHEMICAL →

Blue NITE™

Blue Water's Blue NITE™ technology is covered by one or more patents and patents pending.

The Blue NITE™ process is available in several models and configurations. Contact your Blue Water representative for a comprehensive list.

