

Blue NITE™

Denitrification to <1 mg/L NO₃-N

Blue Water's Blue NITE™ denitrification process allows municipalities to meet permit levels for discharge of wastewater by lowering nitrate to less than 1 mg/L NO₃-N. Blue NITE™ is currently achieving this result at several installations in the U.S. This nitrate removal efficiency can help a plant meet a total nitrogen limit of 3 mg/L.

Blue NITE™ uses upflow, continuous backwash sand filters in a tertiary polishing step. Nitrogen in the nitrate or nitrite forms is biologically converted to nitrogen gas, while also lowering solids concentrations in secondary effluent. The filters are accepted for water reuse applications, including California Title 22.

Total Nutrient Removal

Often it is necessary to lower the concentrations of both nitrogen and phosphorus to protect environmental quality. Blue NITE™ accomplishes removal of both in the same process step. Denitrification to less than 1 mg/L NO₃-N may be performed concurrently with 90% total phosphorus removal by Blue Water's Blue PRO® process, in the same filter. Additional phosphorus and solids removal may be accomplished with a second pass configuration of the Blue PRO® process.

Advantages of Blue NITE™ over other technologies:

- Remove nitrogen and phosphorus simultaneously
- Added benefit of achieving tertiary filtration
- Can use alternative carbon sources
- Filter burping and upset are virtually eliminated
- Modular design easily handles capacity increases
- Low capital
- End of pipe solution, no costly plant redesign
- No expensive recirculation pumping systems as required with pre-denitrification
- CA Title 22 accepted



How It Works

The process is accomplished in a Centra-flo™ continuous backwash, upflow sand filter with a carbon source added to the influent water. Blue Water's Centra-flo™ Filter line is a well-established sand filtration system with more than 250 installations worldwide.

In the filter, fixed-film, heterotrophic, denitrifying bacteria convert nitrate to atmospheric nitrogen (N₂). A portion of the bacteria-laden sand is continuously lifted and passes through a built-in sand washer. The washer separates solids and excess biomass, which are directed to a reject line. The clean sand then falls by gravity back to the media bed.

Nitrogen gas is produced during operation and becomes entrapped by the filter media. This gas is carried down with the sand and is released in the sand washer. Some of the advantages of this method of gas removal include; no false readings of headloss, no backwashing is required, filters will not "burp" and upset if a significant nitrogen bubble accumulates, as typical in static bed filters.

Flexibility

Blue NITE™ is able to accommodate high or fluctuating influent nitrate levels. The process applies to wastewater or groundwater applications. Hydraulic loading rates to Blue NITE™ filters are dependent on influent nitrate levels, variability in influent nitrate, dissolved oxygen (DO) levels, and temperature. The modular design easily handles capacity increases.

In projects using alternatives to methanol as the carbon source, Blue NITE™ has been shown to work with Micro-C™ and UniCarb™. This allows plants more choices for operation.

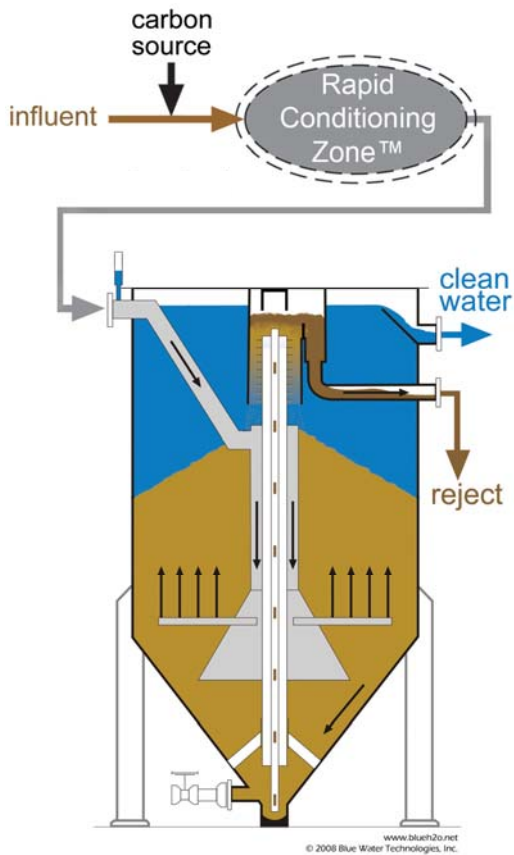


Modular Blue NITE™ systems include the following:

Blue NITE® Models	Flow Rate	Footprint
Skid systems	5-100 gpm	8' x 10' and up
CF-50 fiberglass	0.15 MGD	8' diameter
CF-50 concrete	0.15 MGD	7' x 7'
Quad concrete	0.6 MGD each	15' x 15'

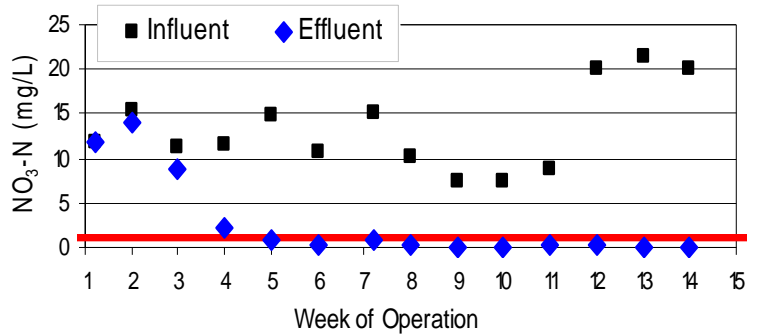


Blue NITE™



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

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



The chart shows weekly average 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.

Blue Water is proud to offer a broad platform of water treatment technologies, from primary wastewater treatment to advanced effluent polishing steps to environmental remediation processes. We strive to meet our customers' needs cost-effectively, considering both capital expense and ongoing operations and maintenance costs. Additionally, we keep an eye on the future by looking for sustainability in our technologies, including environmentally friendly materials and energy conservation.