NanoClear – Water Solutions

Phosphorous Reclamation in Wastewater Streams with PO4 Collector

Phosphate capture for reuse

Wastewater and agriculture runoff bring phosphorous in excess into our waterways. Excessive phosphorus contributes to the harmful algal blooms that deplete oxygen in the water, stifling otherwise healthy ecosystems. However, an important component in agriculture, phosphorous is an increasingly scarce resource. There is significant value in capturing and reusing it before it becomes a pollutant.

NanoClear is using nanomaterials to capture Phosphate with a unique porous media called the PO4 Collector. The PO4 Collector's inorganic polymer-bonded ceramic structure contains an exceptionally high surface area per unit volume (~15 m2/gram, equivalent to about 2,000,000 m2/m3) that is over 100 times higher than other porous media. Surfaces in the PO4 Collector contain forests of nanocrystals that trap PO4 ions while the high porosity (80%) allows water to flow through the media with minimal head losses.

The PO4 Collector captures 5-30 times more soluble phosphorus per unit weight than other removal products. Additionally, the media can be regenerated for reuse and phosphates can be reclaimed. The media can be regenerated quickly, reducing downtime for operating systems. It is done with a simple caustic solution that allows the media to be reused 20 or more times. The regenerated solutions contain phosphate (PO4) ions and potassium (K) ions that can be nutrient input as is or precipitated, collected, and dried as powder.

Testing shows reductions in phosphates to well below 1 mg/L. The design capacity is 20 to 30 mg P/gram of media (60 to 90 mg PO4/gram of media). Absorption depends upon both the concentration and contact time of water with the media. In one test case, flows of 10,000 L/hr with a concentration of 9 mg/L were reduced to 1.2 mg/L in a three-stage system.

The PO4 Collector can be applied in large-scale municipal and industrial systems to reclaim soluble phosphorous for reuse. It has the potential to both improve wastewater treatment and provide renewable sources of phosphorous for generations to come.

PO4 Collector Spec Highlights:

Capture:

- High Phosphate load reduction
- Meet/Exceed Stringent Effluent Standards
- High sorption capacity per unit of media
- Low operating costs

Reuse:

- Captured PO4 can be reclaimed and used/sold
- Requires limited maintenance

For inquiries and more information please be in touch at ebergman@nanoclearwatersolutions.com