



## CAN TRICKLING FILTERS BE USED IN A BNR PROCESS?

Nitrogen and phosphorus are nutrients in a wastewater treatment system. A Biological Nutrient Removal (BNR) process removes either portions of the influent total nitrogen through denitrification or portions of the influent phosphorus through anaerobic selection or both. In a BNR process, ammonia is ultimately converted to nitrogen gas, not just nitrate or nitrite.

If you have requirements for phosphorous removal and denitrification, trickling filters alone will not remove phosphorous, however, they can be integrated in a BNR system. Both BOD filters and nitrifying filters can be integrated in BNR plants where phosphorous is chemically removed. Nitrifying trickling filters may be integrated in BNR plants where phosphorous is biologically removed.

Trickling filters can improve a BNR process in many ways. First, plants with existing BOD filters should have a lifetime cost analysis performed to evaluate the cost effectiveness of retaining these filters by adding denitrification filters in the back for denitrification. Many plants are upgraded to BNR plants with trickling filters in the front for BOD and nitrification (significant capital costs and energy savings that can offset costs for supplemental carbon for denitrification) plus a denitrification sand filter in the back. Second, nitrifying trickling filters can be an energy-efficient alternative for the nitrification stage of a BNR plant versus many other energy-demanding technologies such as MBBR, etc. Third, existing BOD filters can be converted to nitrifying trickling filters if BOD needs to be conserved for denitrification.

There are some situations where trickling filters do not fit, such as plants with extremely high BOD concentration (>5,000 mg/L). Trickling filters for BOD removal are also not ideal for new BNR systems. For BNR upgrades, a lifetime cost analysis should be performed to determine whether

the BOD filters should be retained, converted to nitrification filters, or demolished. There are plenty of BNR plants that use BOD filters—contact us to learn more about these applications and installations.