

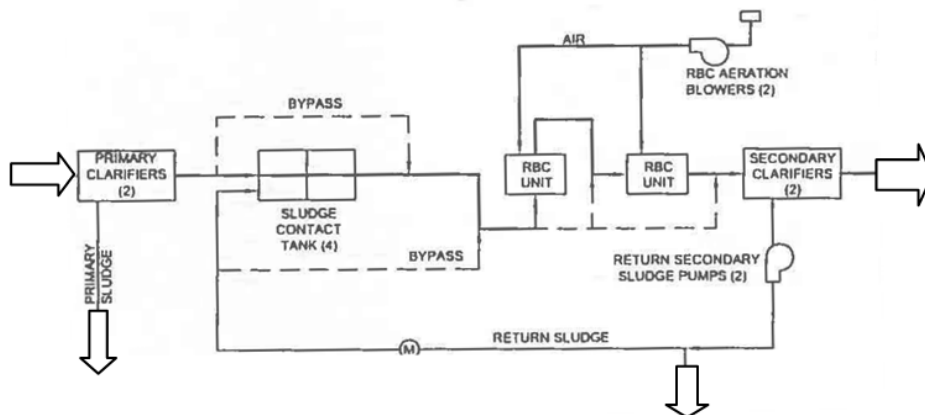
Less Than 1 ppm Phosphorus – BNR with No Chemical Addition



Full Scale WWTP Operation of a RBC/SR Process for Maximized BNR

Introduction

A biological nutrient removal process evaluation was performed at the WWTP in the City of Phillips, Wisconsin. This plant was designed for an average flow of 0.374 mgd, a peak flow of 1.4 mgd and current WPDES monthly average permit levels of 25 mg/l CBOD₅, 30 mg/l suspended solids, and 1.0 mg/l TP. Phosphorus limits also include a 6-month average of 0.7 mg/l May through October. Effluent from the plant is discharged to Elk Lake public waterway. This evaluation included both winter and summer operation to ensure year-round effective plant performance.

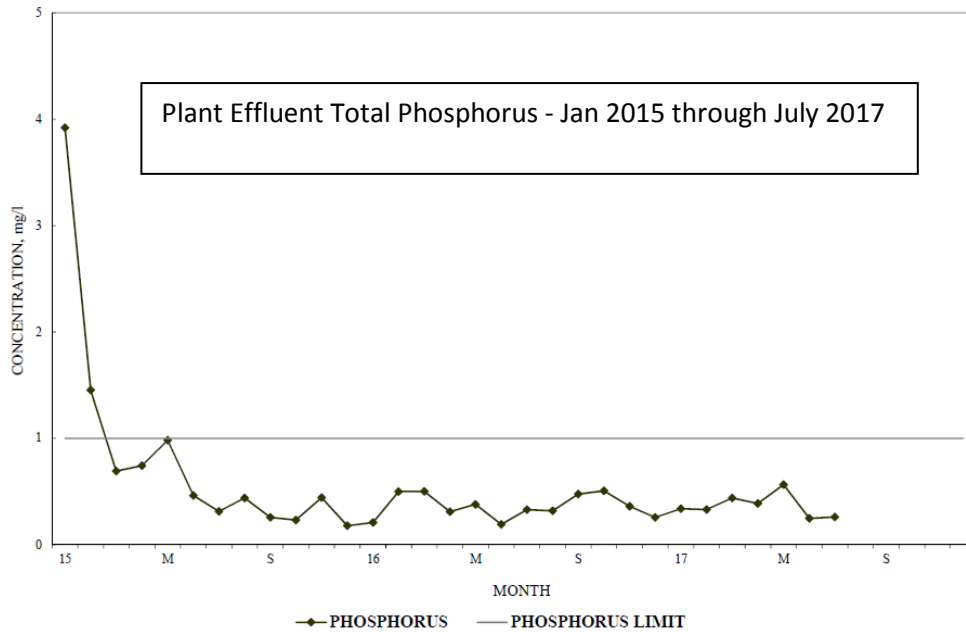


A Secondary Treatment Plant

After normal headworks treatment, Secondary Treatment of wastewater for removal of BOD₅, SS, and phosphorus is achieved using a Rotating Biological Contactor/Sludge Recirculation process (RBC/SR). This simple, elegant, versatile and robust process uses an anoxic/anaerobic sludge contact tank (SCT), a two stage RBC system, sludge recirculation system, and secondary clarifiers. Effluent from the primary clarifiers flows to the SCT which has four compartments to allow return secondary sludge (RSS) to be added to any compartment and allow primary effluent to enter either half of the tank. The effluent from the primary clarifiers presently mixes with RSS in the first compartment which acts as an anoxic reactor when nitrification is occurring in the RBC system. The anoxic compartment creates conditions favorable for Denitrification of the RSS and SBOD₅ removal. The wastewater then passes into anaerobic compartments of the SCT that create conditions favorable for the development of phosphorus accumulating organisms. Phosphorus release and SBOD₅ removal occurs in the anaerobic compartments. The effluent from the SCT flows to the RBC process, providing aerobic conditions to allow phosphorus uptake, BOD₅ removal, and oxidation of ammonia to nitrite and nitrate. The mixed liquor from the RBC effluent flows by gravity to secondary clarifiers.

Plant Performance

Proof of effective Phosphorus removal was the primary goal of this evaluation. Effluent TP is shown below, from January 2015 through summer 2017. Unanticipated equipment failure explains the TP spike which began in 2014 and continued until repair of the process and return to normal operation was completed in early 2015. Note that since that event and throughout 3-summers and 2-winters of operation, Total Phosphorus remains well below limits and approximately 90% of the time is less than or equal to 0.5 mg/l.



During August 2016, additional plant testing was conducted to understand more thoroughly the overall operation of the plant. During that test period, the following results were noted.

Secondary Treatment Characteristic	% Removal from Primary Effluent
SBOD ₅	96
TSS	92
TKN	81
N-NH ₃	77
TP	90
Orthophosphate	91

We hope this brief summary of an RBC based BNR process proves to be of value. Please feel free to contact us or our Sales Representatives for more information about the *EnviroDisc* RBC process.



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