



Case Study

Hach's On-line EZ Series Phosphorus Analyzer allows piece of mind and prevents permit violations

The Marlborough Westerly Wastewater Treatment Plant is an advanced wastewater treatment facility designed to handle a daily average flow of 2.89 million gallons per day. The facility treats sewage from the westerly portion of Marlborough (west of Route 495) and the Town of Northborough under an inter-municipal agreement.

The facility operates under a National Pollution Discharge Elimination System (NPDES) permit issued by the EPA and Massachusetts DEP. Scott Mello is the Chief Operator. The plant is one shift operation and does not have staff at the facility overnight.



NPDES Total Phosphorus Permit Summary:

- Summer monthly average: 0.1 mg/l
- Daily maximum: 0.2 mg/l
- Monthly average/Daily maximum Winter (Nov-March): 1 mg/L
- Regionally we are seeing stricter permits with neighboring plants preparing to meet their summer TP levels all year.

Challenges

2022 was a challenging year for the plant. They had four permit violations.

Marlborough has a lot of industry, the plant has been known to get "super hits" of discharges that can negatively affect plant. He'll start to see foaming in primaries and assumes someone is doing a cleaning process.

Hach's EZ Series Phosphorus on-line analyzer gives him red flag that something is coming through the plant. He'll see phosphorus spike up to 1-2 mg/L, this allows him to investigate and flow pace dose ferric chloride into the raw influent stream. Chemical dosing is approximately 2 gallons/hour.

A spike of 0.25 mg/L Total Phosphorus occurred in February 2024. Without the EZ Series Phosphorus analyzer he never would have caught it, he would have had no clue until a laboratory sample was analyzed. The EZ Series gives him more time to counter act the incoming phosphorus spike. The analyzer takes a sample every hour pre and post his sand filters and analyzes for both total phosphorus and orthophosphate.

February 22, 2024

	Total Phosphorus
Daily Maximum Permit Limit	0.2 mg/L
Secondary Effluent	0.21 mg/L
Post-tertiary Sand Filter	0.13 mg/L
EZ Series Spike Overnight	0.25 mg/L



The phosphorus data and trending information allows him to turn up his wasting and send more to the thickeners and press it out.

The dual stream, two channel EZ analyzer measures pre and post tertiary sand filters. This allows the plant operators to see the difference between pre and post sand filters to know if anything is going on in sand filters and provides a full picture. The EZ data trends should show a drop in phosphorus with the tertiary treatment removing mostly the reactive phosphorus and some ammonia.

The City of Marlborough has high infiltration and inflow with corresponding high flows that can correlate to higher than normal phosphorus levels due to fertilizers or other outside sources along with sand displacement in the tertiary treatment. These factors reduce the effectiveness of the treatment.

Spring time tends to bring spikes of phosphorus as industries and facilities are using chemical cleaning products made with phosphorus. These chemicals eventually make their way to the plant influent spiking up to 2 mg/L and causing foaming at the primaries. The operators can manually dose ferric chloride in the raw influent and flow paced to the secondaries while turning up wasting out of the secondary clarifiers to the thickeners to eventually press out the phosphorus. The EZ Series analyzer data trends in SCADA allow the plant to react and take action faster than previous operations with a 24 hour composite sample. Hach's on-line EZ Series Phosphorus analyzer has prevented daily P limit violations.

Wastewater treatment plants can be easier to operate when processes are consistent. The EZ Series analyzer allows them to achieve their more stringent Summer permit limit all year long and keep the plant running well and efficient. The bacteria or "bugs" stay acclimated to the process which saves them from potential permit violations and uses less chemical.

The EZ Series Phosphorus analyzer draws sample out of a constant head sample sink. Inexpensive centrifugal pumps provide samples from pre and post sand filters. There is a coarse screen on the secondary pump that gets cleaned weekly as the same time as the constant head sample sink. There are check valves on the discharge.



The laboratory personnel utilize Hach's laboratory DR3900 visible spectrophotometer. Hach's easy to use TNTplus chemistry allows you to test for reactive or total phosphorus with each vial with multiple range options available as low as 0.01 mg/L PO₄-P. The lab test matches within +/- 0.01 mg/L. "Words that come to mind when describing the DR3900 and chemistries are convenient, easy to follow and user friendly" said their lab chemist.

The plant has partnered with Hach's Service Division for the preventative maintenance of the instrument. A factory trained Field Service Technician is dispatched quarterly and allows for peace of mind with an annual renewable service plan providing a one-time service fee that includes all parts, labor, travel and any unexpected repairs. A certified report is sent following the service visit. Scott Mello commented "The Hach Service Technicians are very knowledgeable and professional. They are awesome!"

By Amy Pollock and Trina Picardi, Hach Company



World Headquarters: Loveland, Colorado USA | [hach.com](https://www.hach.com)

United States 800-227-4224 fax: 970-669-2932 email: orders@hach.com
Outside United States 970-669-3050 fax: 970-461-3939 email: int@hach.com

©Hach Company, 2024. All rights reserved.

In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.

DOC043.53.30811.Jun24