

Future-ready phosphorus control in Kewaskum, Wisconsin

Real-time orthophosphate automates dosing
and supports future upgrades



Aeration basins at Kewaskum WWTP,
which treats 0.4 MGD for a community of about 4,000.

Author

Adrienne Stenz, *Application Development Engineer*

Overview

Serving a small Wisconsin community of 4,000, the [Kewaskum Wastewater Treatment Facility \(WWTP\)](#) manages an average flow of 0.4 million gallons per day (MGD).

Like many small utilities, the plant must balance operational simplicity with increasingly stringent nutrient limits. To protect the Milwaukee River, the plant must meet seasonal phosphorus limits - as low as 0.22 mg/L total phosphorus (TP) during spring.

In 2024, the facility installed the [YSI Alyza IQ PO4 analyzer](#) to monitor orthophosphate in the final effluent continuously. The analyzer provides high-accuracy phosphorus data to support permit compliance, inform chemical dosing strategies, and guide future upgrades.

End user: Kewaskum WWTP

Xylem's role: YSI Alyza IQ PO4 analyzer for continuous phosphorus monitoring

Project results: Real-time data supports precise chemical dosing, seasonal permit compliance, and piloting of tertiary filtration for future upgrades.

Challenge: Supporting optimization and preparing for upgrades

Kewaskum faces the challenge of meeting current permit limits while also planning for future infrastructure upgrades.

The Alyza IQ PO4 analyzer was installed in September to reduce reliance on grab samples and provide real-time orthophosphate data to optimize current chemical phosphorus removal strategies.



The Alyza IQ PO4 analyzer installed indoors in the UV disinfection building, providing continuous orthophosphate monitoring.

Total Maximum Daily Load (TMDL) limitations

Month	Monthly average phosphorus effluent limit (lbs./day)
January	1.81
February	2.03
March	1.98
April	0.70
May	2.45
June	1.85
July	1.42
August	1.26
September	1.89
October	1.36
November	1.85
December	1.72

Kewaskum’s seasonal phosphorus limits are as low as 0.22 mg/L in spring. Real-time monitoring helps ensure consistent compliance.

“I sold my board on the idea of buying equipment now that helps us upgrade smarter later – and Alyza was one of the first things I picked up.”

Ben Propson, Wastewater Supervisor

The analyzer was installed indoors in the UV-disinfection building and integrated with SCADA to monitor effluent orthophosphate. Kewaskum currently uses chemical dosing to meet TP effluent limits.

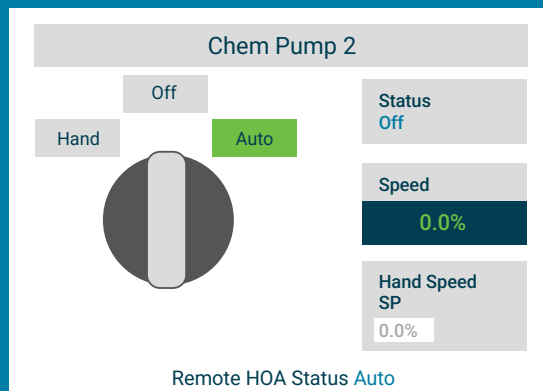
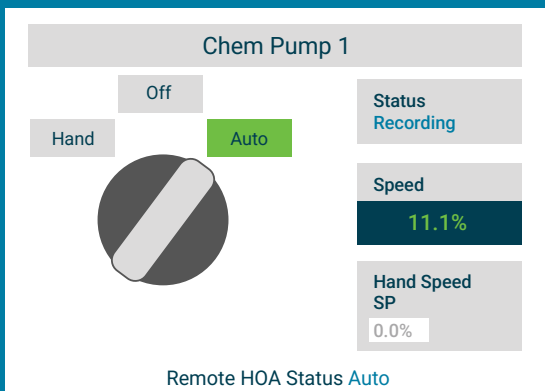
The dosing strategy is a hybrid approach—ferric chloride feed is dosed based on a percentage of influent plant flow, while real-time effluent orthophosphate data from the Alyza IQ PO4 adjusts the pump speed based on a 0.2 mg/L setpoint.

This approach ensures chemical efficiency while maintaining compliance with tight seasonal phosphorus limits.



Alyza features a revolutionary MultiPort Valve that dramatically reduces reagent use and maintenance requirements.

SCADA



Max Speed	20.0	%
% of Plant Flow	25.0	%
Target Setpoint	0.20	mg/L
Setpoint Deadband	0.05	mg/L
Multiplier (gain)	0.10	
Normal Time Change	3600	Sec
Minimum Time Change	2000	Sec
Max Error to Use Minimum Time	0.10	mg/L

Max Speed	15.0	%
% of Plant Flow	15.0	%
Target Setpoint	0.20	mg/L
Setpoint Deadband	0.05	mg/L
Multiplier (gain)	0.10	
Normal Time Change	3600	Sec
Minimum Time Change	2000	Sec
Max Error to Use Minimum Time	0.10	mg/L

Setpoint-based ferric dosing logic as visualized in SCADA. This current strategy blends a flow-paced based dose with setpoint-based adjustments. This hybrid logic ensures stable chemical feed during flow fluctuations while leveraging real-time PO₄ data to fine-tune dosing for optimal efficiency.

Solution: A platform for optimization and piloting

With tertiary filtration upgrades planned for 2028, the Alyza has already proven invaluable in pilot testing. Operators have used the analyzer to simulate process conditions by allowing PO₄ levels to rise, enabling meaningful tests on chemicals for phosphorus removal, including testing rare earth coagulants.

In one pilot, phosphorus was intentionally increased to 0.4-0.5 mg/L to evaluate the performance of a trial tertiary filtration system. The analyzer provided continuous influent monitoring to the pilot unit, enabling data-driven evaluation of removal efficiency.

“Alyza gives me the confidence to track PO₄ in real-time, especially during pilot testing. I let levels creep up just enough to track filter performance.”

Ben Propson, Wastewater Supervisor

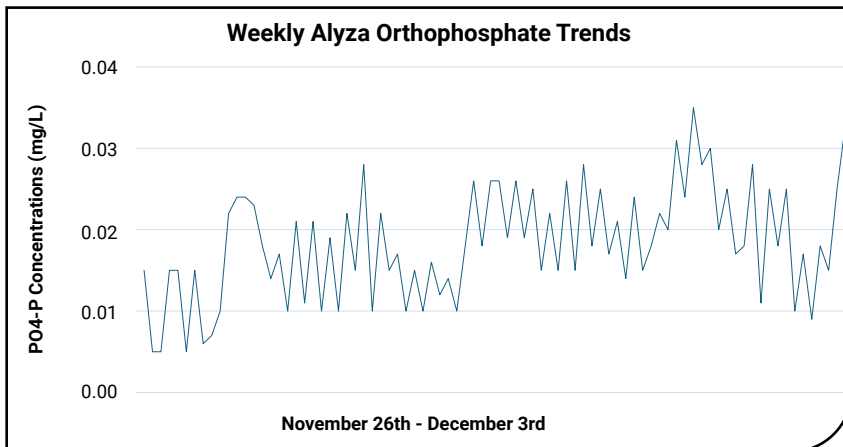
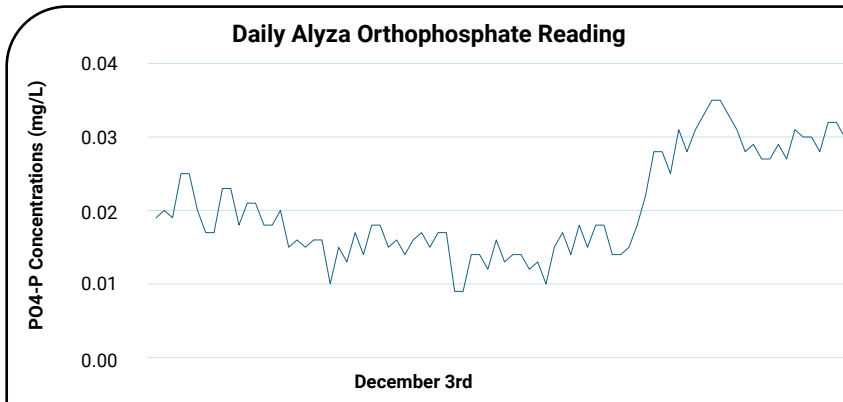


Small plant, high standards:

Kewaskum treats just 0.4 MGD- but meets limits that challenge plants ten times its size.

Results: Reliable data and readiness for the future

Since installation at Kewaskum WWTP, the Alyza IQ PO4 has operated without issue and required minimal operator assistance. With automatic daily calibration, the unit delivers consistent, accurate measurements. Located in the final effluent, the analyzer provides a robust checkpoint for the facility.



Daily and weekly orthophosphate trends, tracked by the Alyza IQ PO4 analyzer. November 26th – December 3rd.

Conclusion: Planning for 2028 and beyond

The Alyza has already helped the utility streamline ferric dosing, generate reliable data for pilot studies, and prepare for long-term process changes – all while supporting current permit requirements.



“This analyzer helps me bulletproof the plant so that the next operator doesn’t have to worry about it.”

Ben Propson, Wastewater Supervisor

Sources:

1. Ben Propson, Interviewed by Adrienne Stenz. Wastewater Supervisor, Kewaskum WWTP. Conducted December 2024

YSI Inc.
1725 Brannum Lane
Yellow Springs, OH 45387

Tel +1 937.688.4255
ysi.info@xylem.com
ysi.com

All information presented herein is believed reliable and in accordance with accepted engineering practices. Xylem makes no warranties as to the completeness of this information. Users are responsible for evaluating individual product suitability for specific applications. Xylem assumes no liability whatsoever for any special, indirect or consequential damages arising from the sale, resale or misuse of its products. Subject to change without notice.

© 2025 Xylem Inc. or its affiliate. All rights reserved.

XA00381

xylem
Let's Solve Water