RTC-P Brings Phosphorus Compliance Solution to JBS Beef Processing

Problem

The wastewater treatment facility at one of the world's leading animal protein processors must maintain very strict environmental standards of < 1.6 mg/L Total Phosphorus in accordance with their consent to discharge limit. There was concern that meeting this restrictive limit would become a compliance challenge due to the highly concentrated influent from their beef processing and rendering facilities.

Solution

The Hach® RTC-P system provides real-time analysis of orthophosphate, translates the result to a Total Phosphorus reading, and automatically controls the chemical precipitant dosing pump to regulate delivery. Hach's RTC Helpdesk monitors the system remotely for proactive rapid response to potential problems.

Benefits

The customer has consistently met Total Phosphorus compliance standards without a single violation since the RTC-P system was operational. Additionally, the plant significantly reduced its chemical and sludge handling costs, saving $60K within the first year of operation.

Background

The wastewater treatment plant (WWTP) receives influent flowing at approximately 1.5 million gallons per day, and must discharge Total Phosphorus (TP) seasonally at < 0.8 mg/L in Summer and within < 1.6 mg/L in Winter as average monthly limits by permit. The WWTP handles the water for both the beef processing and rendering facility.

The plant operators historically tested the effluent every 6 hours for TP and manually adjusted chemical precipitant dosing pumps. The test procedure took about 2 hours to complete and results were highly variable. While the test readings were accurate and reliable, the adjustments only worked for that particular sample since daily inflow and phosphorus concentration fluctuated significantly.

Wastewater from the beef processing and rendering facilities are very high in solids. Production rates, animal by-product, and cleaning chemicals also create variability. Additionally, overfeed of iron and aluminum-based chemistries result in significant solids contribution and sludge viscosity.

The plant discharges directly to the Skippack Creek, which ultimately feeds the Delaware River, and is upstream from Evansburg State Park which features public fishing and picnic areas near the water. TP levels, especially during the summer months when compliance limits are more stringent, were difficult to keep under the allowed threshold. The customer required a solution that minimised the potential for higher TP remaining in the final effluent and ensured water quality to the neighboring natural environment.

Solutions & Improvements

The Hach Real-Time Control System for phosphorus (RTC-P) measures ortho-phosphate and flow rate to calculate and dose the exact amount of precipitation chemical needed to meet the TP set-point of < 1.6mg/L.

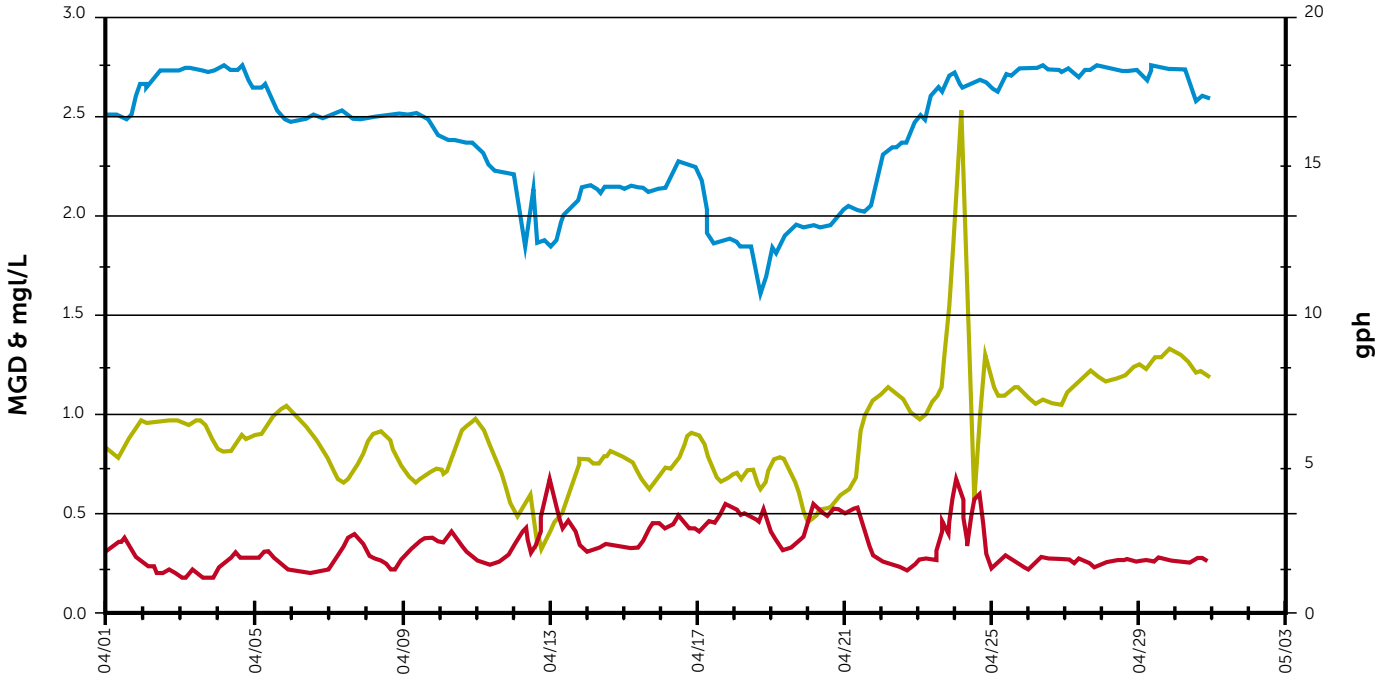
The RTC-P is paired with the Phosphax Analyser, which samples and tests the final effluent every 5-7 minutes and communicates with the RTC-P via the SC1000 digital controller. The system then adjusts the dosing of precipitant to accurately control phosphate levels in the output. Phosphax provides 288 data points per day, compared with the customer's previous 4 data points per day using manual testing and dosing.

If there is a spike in the phosphorus levels or an issue with the equipment, the system will notify the customer and Hach's RTC Helpdesk via text message alerts. Hach will then call the plant operator to identify the cause in order to address the problem proactively.

With Prognosys, a predictive diagnostic system within the Phosphax analyser, they are also alerted to any upcoming instrument issues that are displayed on the SC1000 controller and can be proactive with their maintenance. This helps the WWTP operators know with confidence whether changes in measurements are due to changes in their instruments or the water itself.

Figure 1: The JBS WWTP Plant empties directly into the Skippack Creek, which ultimately feeds the Delaware River. (Image: Google Maps)

Figure 2: Example RTC-P system



Results

Since the RTC-P system was placed in dosing control, the WWTP has not encountered a single TP non-compliance violation. They are now much more confident in maintaining their wastewater quality, providing peace-of-mind that they will be able to consistently meet compliance requirements in the future.

Additionally, the company received a major financial benefit by saving $60K in the first year in reduced chemical costs, along with improved sludge-handling.

Conclusion

By installing the RTC-P system, the customer is able to treat a high volume of water from multiple plants and meet stringent compliance standards for phosphate reduction with confidence.

The company's environmental director stated that "Hach customer support was exceptional." The Hach RTC Helpdesk continually monitors the plant's phosphorus treatment operations, equipment and chemical dosing. The RTC system also provides alerts to the customer if instrument anomalies are encountered or reagents run low. The plant reports that the system is very easy to use and has improved their testing and dosing procedures significantly.

Performance		Legend
Avg Eff PO_4-P	0.34 mg/L	Residual
Avg Dose Rate	15.10 gph	Dose Rate
Avg Flow Rate	2.40 MGD	Flow

Figure 3: RTC-P is in control: By getting real-time test data every 5-7 minutes, 288 times per day, the plant is able to detect phosphorus changes quickly, monitor quality, dose as needed and adjust set-points throughout the week. The plant is successfully keeping TP levels well under the average discharge limit.

Summary

The customer receives onsite and remote support from Hach specialists assisting with installation and ongoing monitoring through the RTC Helpdesk, keeping operations running smoothly. The Phosphax tests the water every 5-7 minutes and provides the RTC-P controller with up to 288 data points per day, which then adjusts the chemical dose in real-time to handle spikes in phosphate levels or reduce dosage during overfeed situations. Hach also paired the RTC-P with its Prognosys™ predictive diagnostic system to ensure compliance by preventing unexpected instrumentation emergencies. If phosphate levels exceed set limits, the helpdesk and plant operators are notified via text message immediately so they can address any issues with chemistry or equipment. The RTC-P system allows the WWTP to manage phosphorus removal with confidence.

With the RTC-P system implemented, the WWTP benefits from:

- Stable phosphate effluent values controlled at < 1.6 mg/L average monthly Total Phosphorus discharge limit.
- Increased savings in reduction of chemical costs and sludge-handling.
- Excellent customer support and proactive monitoring for continued efficiency.
- Improved water quality at the final effluent and peace-of-mind.

Figure 4: Example Phosphax real-time data

About the Customer

JBS Regional Beef

World leading animal protein processor

Region: Philadelphia, PA

Interviewee Name: Damon Depew

Position: Corporate Environmental & Utilities Director

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