VEOLIA

Food & Beverage Manufacturer Uses Sievers* TOC-R3 for Upset Detection and Process Control

CASE STUDY | Food & Beverage

| Challenge

A food and beverage (F&B) manufacturer needed a faster method to detect process variability in their wastewater in order to prevent organic overloading of their new anaerobic digesters during biological treatment. Specifically, a distillery bottling facility in Kentucky, USA experienced challenges detecting upsets that were entering their wastewater stream while also facing increased restrictions on their wastewater discharge limits.

The F&B plant was using biological oxygen demand (BOD) to monitor their wastewater by sending samples to an offsite laboratory, but this method was not capturing excursion events fast enough. The facility needed a continuous monitoring tool that would produce rapid results, easily correlate to BOD and ensure stable organic flow into their anaerobic digesters. The consequences of overloading organics to the anaerobic digestion leads to a shock of the microorganisms which causes a decrease in treatment efficiency.

Water is used in bottling plants during a variety of processes, including distillation, cleaning, cooling, and fermentation. Distillery wastewater is one of the most challenging waters to treat in the F&B industry with roughly 88% of a distillery's raw materials being converted to waste[1]. Faster information about wastewater quality can enable F&B manufacturers to quickly and confidently make decisions that impact compliance and ultimately profitability.

| Solution

This F&B manufacturer deployed an online total organic carbon (TOC) analyzer to improve detection of spill events and prevent organic overloading of their new anaerobic digesters.

Monitoring total organic carbon (TOC) for wastewater instead of BOD provides many advantages including:

- Gathering real-time data to maximize understanding of wastewater quality and quickly make decisions
- Trending the complete organic loading, separation and removal

| Key Metrics

- Customer gained insight into variability of wastewater through continuous TOC monitoring
- TOC data used to control and improve treatment
- Sievers TOC-R3 proved capable to handle complex sample matrix and provided high customer uptime

| Results

The TOC-R3 provided fast, reliable results by being responsive to changes in the wastewater loading from manufacturing processes. With real-time information using TOC analysis, the facility gained better understanding of their wastewater patterns to optimize performance of their anaerobic digesters. Compared to BOD, they were able to confidently make faster decisions for process control.

- Providing more precise and rapid results to prevent organic overloading events
- Improving process understanding and control

BOD indirectly measures organic content by measuring oxygen demand while TOC directly monitors carbon loading, thus providing better insight into wastewater treatment efficiency. BOD yields results within a lengthy five day period which is not ideal for process control. Within minutes, TOC analysis can quantify the sum of organic contamination in a sample and provide the information needed to make decisions confidently.

| Results

A Sievers TOC-R3 Online TOC Analyzer was installed for a three week demonstration to continuously monitor wastewater variability and detect periods of higher loading. The TOC-R3 was set up to measure samples ahead of the equalization tank which was before it was released to the city. BOD samples were also gathered during the trial period to compare and verify successful results of the TOC analyzer.

Figure 1 demonstrates the ability of the Sievers TOC-R3 to rapidly detect excursions in the wastewater. Key results of the study included:

- The Sievers TOC-R3 could continuously monitor wastewater, even with complex, variable sample matrices
- The F&B manufacturer learned about patterns and trends in their process that were not revealed using BOD
- Faster decision-making was possible using TOC analysis to monitor organic loading

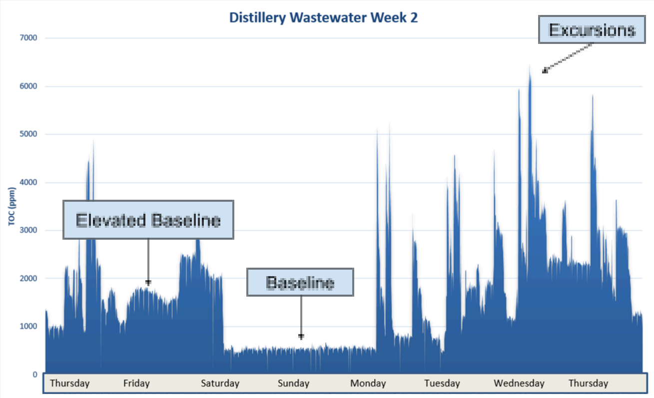

Figure 1. Week 2 Distillery Wastewater

While the distillery expected to see peaks and valleys throughout the day, they had no way of knowing exactly when or how much changes were occurring without continuous monitoring. This trial demonstrated that the distillery wastewater was variable based on production activity and there was no predictable time of day or day of the week where spikes in TOC were occuring.

| Conclusion

The facility learned that their wastewater fluctuated throughout the week due to the activities in the production area and they could easily detect the variations in wastewater loading that occur using continuous TOC analysis.

Due to recent BOD restrictions, the facility is building a new treatment facility onsite to handle and monitor larger and variable loads of wastewater which will include anaerobic digesters as part of the treatment train. The treatment train will also include a calamity tank so that if the TOC analyzer does detect elevated organics to the wastewater stream, the facility can divert the stream and dilute to a safe enough organic level for the anaerobic digesters.

The Sievers TOC-R3 is capable of handling complex and variable F&B sample matrices without maintenance issues. By installing the online TOC analyzer, the distillery bottling facility was able to better understand their wastewater patterns to ensure the effectiveness and health of their biological treatment.

| References

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