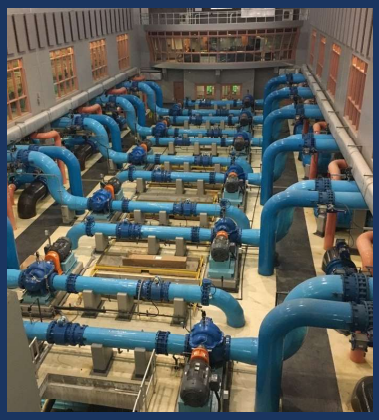
OCWA Case Study

Real-time, low maintenance drinking water quality monitoring - detecting events at raw water intake and treated water locations. Raw Water and Biological Activated Carbon Contactors (BACC) effluent sensors for immediate action in response to significant changes in incoming water conditions.

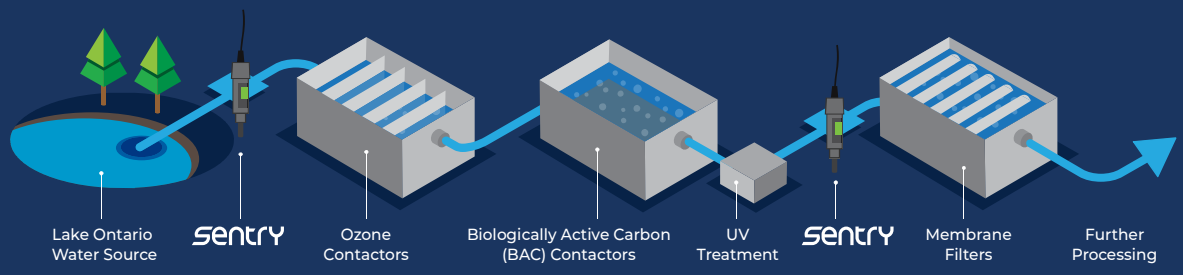
Problem Statement

Raw intake source water quality can change rapidly and impact drinking water treatment performance. These water quality events are not typically caught by traditional sampling methods or sensors in time to be managed efficiently. Always on, low-maintenance water quality monitoring would provide better protection from incoming water quality issues by alerting operators to key events in real-time.



Deployment:

The Arthur P. Kennedy water treatment plant pulls source water from Lake Ontario. The water is dosed with Ozone and filtered through Biological Activated Carbon Contactors (BACC), treated with UV and additional chemical processesbefore leaving the treatment facility. SENTRY probes were installed at the Raw Water inlet and after the UV reactors at the BACC outlet.



Value Proposition:

- **SENTRY is the only real-time biological monitor for instant insight into microbial activity. It provides data every minute and requires minimal maintenance vs light-based monitors and manual samples.**
- **SENTRY can provide information to adjust treatment processes based on incoming raw water and BACC treatment output.**

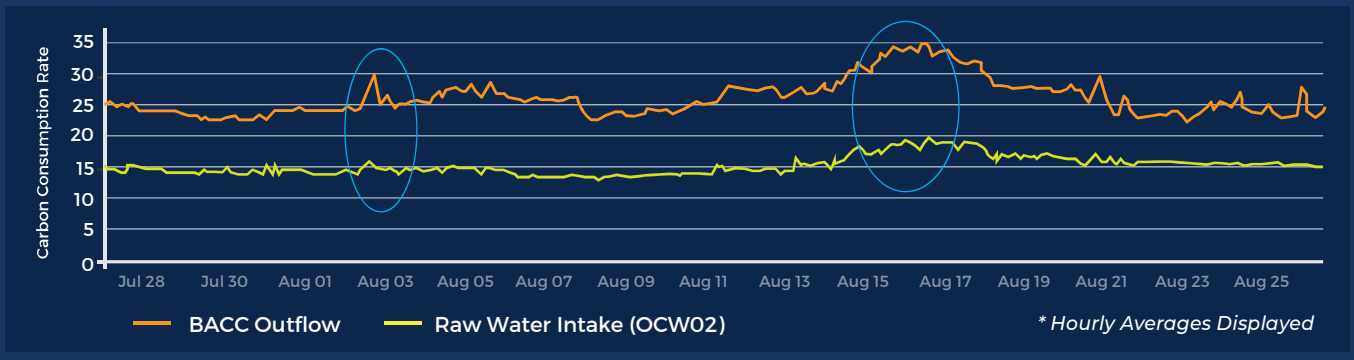


Figure 1: Rises in activity at Raw Water Intake (OCW02) correspond to more exaggerated rises in activity at the BACC outflow during this 1-month period in 2020, underscoring the importance of knowing the quality of the influent water for proper treatment operations

The Experience:

The SENTRY sensors flagged several notable imbalance events at the Arthur P Kennedy facility during its deployment. During the 20-week sample report period, 11 events were specifically highlighted by the SENTRY technical support team. Six of these events were from 'known' factors such as increased turbidity in the influent, backwash filter cleaning procedures, and bypass events where effluent from a nearby treatment plant was releasing untreated stormwater overflow directly into the source water area

The two SENTRY sensors demonstrated the ability to alert operators to increased activity in raw water hours earlier than traditional turbidity measurements. Sensor data quantified the size and persistence of impacts to microbial activity from bypass, backwash, and shutdown events. Additionally, the sensors required no maintenance during the deployment period and the SENTRY data could be used to track against other parameters for a better understanding of the biological processes unique to this facility.

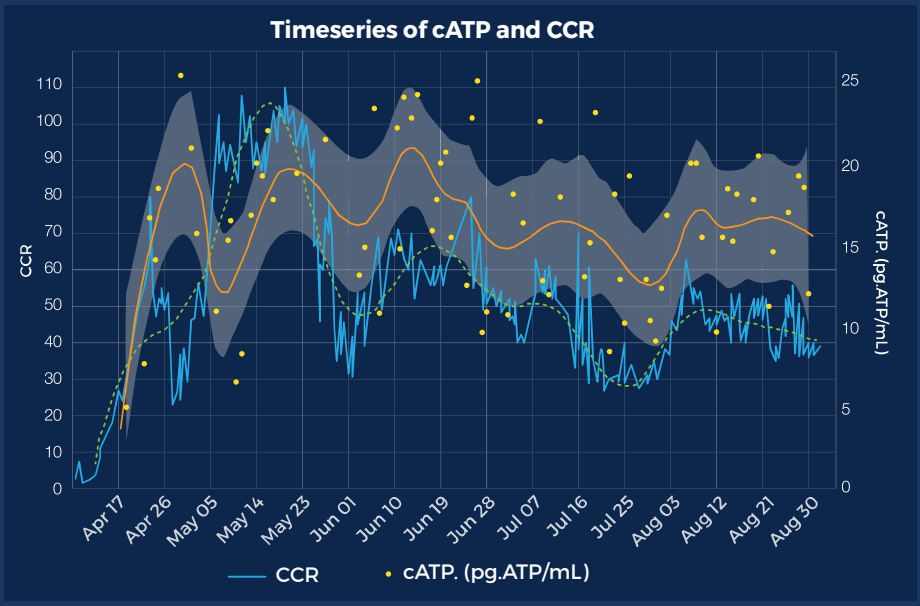


Figure 2: Timeseries showing the relationship between measured cATP (yellow dots – sample data, grey bar – smoothed data) at the effluent sample location and the Carbon Consumption Rate as measured by the SENTRY Bioelectric sensor at the BACC effluent

What was solved:

- **Frequent CCR outliers in raw water indicate brief fluctuations in source water quality happen often.**
- **Bypass and other upstream events cause a disturbance in the Carbon Consumption Rate (CCR) measured by the SENTRY sensor at both probe locations.**
- **High CCR at the BACC location suggests low chlorine residual in the effluent water.**
- **ATP and CCR data track well, indicating that CCR can be used to estimate rising or falling cATP concentration activity.**
- **Comparing SENTRY to a plant processing a total of 10 manual samples per week, there are over $25,000 in manual sample costs savings per week while providing real-time information.**

What does this mean for the future?

- **SENTRY can be an effective and inexpensive tool for monitoring process stability and tracking periods of instability against known and unknown influent and operational changes.**
- **When CCR changes rapidly or significantly (eg. over a 1-h span), manual sampling and operational adjustments should be made to respond to those changing inflow conditions.**
- **Timing backwash cycles to occur when CCR is trending upwards (CCR >70) could be guideline to ensure backwashes are performed when they are most necessary and when incoming water is lower quality.**