QCL WATER SCIENCE

PeCOD

Industrial Wastewater Treatment

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Industrial wastewater treatment facilities are integral parts of protecting local ecosystems by removing contaminants from water generated during industrial processes. Since these facilities discharge large amounts of water, they must meet municipal biochemical oxygen demand (BOD) standards. Industries including automotive, manufacturing, steel, chemical, and dairy often produce a significant amount of wastewater. Therefore, it must be treated and tested before discharge.

BOD indicates how much oxygen bacteria need to break down organic material in water. Since high levels of organic material can harm aquatic life, BOD is one of the indicators of water quality. Monitoring BOD ensures that water discharged into the environment does not contain large amounts of organic matter. However, BOD testing takes five days to complete, delaying real-time monitoring. During this period, wastewater can accumulate and make the process inconvenient.

As a result, alternatives to BOD are available, including chemical oxygen demand testing using dichromate (CODCr). Analysts can assess organic contamination more quickly with CODCr compared to BOD, completing the process in just three hours. Despite its speed advantage, the CODCr exposes analysts to harmful chemicals, namely dichromate, mercury, and concentrated acid. The CODCr process also requires expensive hazardous waste removal.

Mantech offers a rapid, safer alternative. The PeCOD analyser obtains 10-minute BOD/COD results, without the use of hazardous reagents. The PeCOD obtains 10-minute BOD/COD results, without the use of hazardous reagents.

Clean Harbors

Clean Harbors offers a range of services to handle hazardous and non-hazardous waste, recycling, reclamation, and remediation for various industries in North America. The company's plant in Guelph, Ontario utilizes highly refined, chemical precipitation processes, which remove heavy metals, suspended solids, and organics to generate safe effluent. It is essential that their product meets the municipal discharge requirements to ensure that the environment is protected.

Results

The results below are from a single Clean Harbors treatment plant in Guelph, servicing industries including automotive, manufacturing, primary steel, chemical, and dairy facilities. Samples were prepared by centrifugation to settle solids then mixed in a 1:49 ratio with RED range PeCOD electrolyte. The results indicated a strong correlation between PeCOD COD and CODCr for incoming hauled wastewater (Figure 1). Similarly, the results from treated wastewater samples taken from various industries demonstrated a strong correlation between PeCOD COD and BOD5 methods (Figure 2).

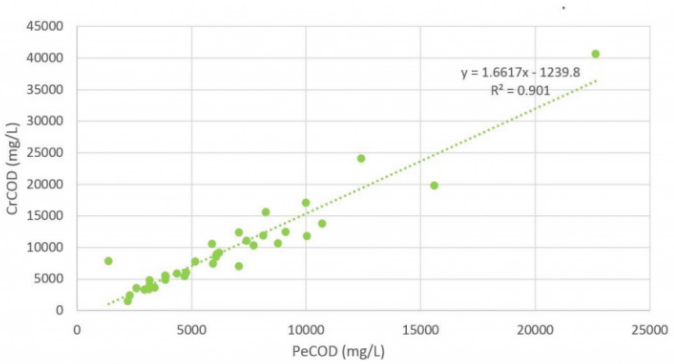


Figure 1: A scatter plot demonstrating a strong correlation between PeCOD COD and CODCr for incoming hauled wastewater from a variety of industries

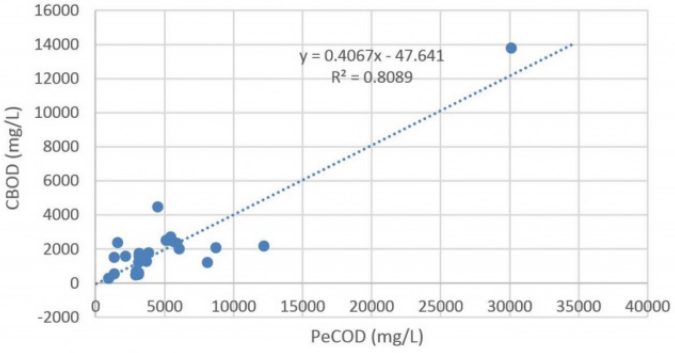
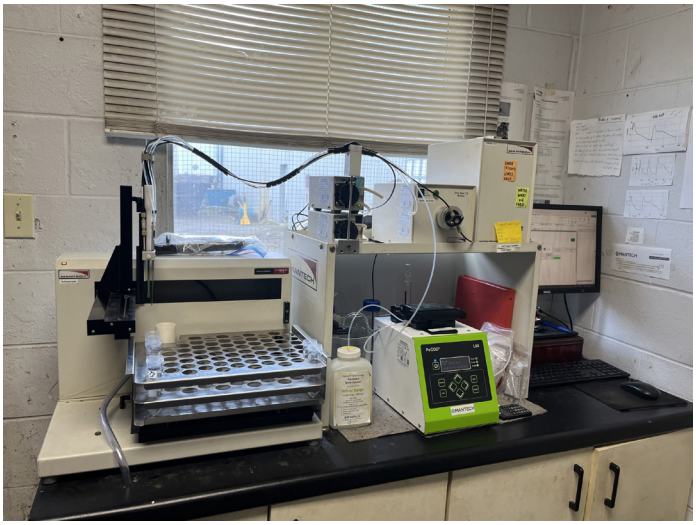


Figure 2: A scatter plot demonstrating a strong correlation between PeCOD COD and BOD5 for composite daily sampling of treated wastewater effluent discharged

Outcome

Upon completion of the study, Clean Harbors invested in the PeCOD COD Analyzer, complete with autosampler, immediately putting it into production and replacing the CODCr method. The key advantage for Clean Harbors in adopting the PeCOD COD Technology was the speed of the test. For example, the wastewater facility can obtain critical information on incoming loads within 10 minutes, allowing for quick decision making and efficient treatment.

Prior to unloading, the analyst obtains a CODCr measurement using the PeCOD. If the result exceeds the acceptable limit, the analyst immediately diverts the truck to an incinerating plant. However, because the CODCr method takes approximately two hours to produce results, the truck would have already unloaded the wastewater and left the facility. Avoiding this time delay eliminates the requirement for subsequent storage and hauling costs.



Furthermore, incoming wastewater that meets plant sewer discharge limits can be quickly discharged, reducing chemical and energy costs. Additionally, the PeCOD provides a reliable estimate of BOD, which is required for compliance with municipal standards. Historically, Clean Harbors Guelph received BOD results eight days after sampling. Now, the facility receives a daily real-time BOD estimate, ensuring peace of mind with regards to their treated discharge effluent.

Following the success of the PeCOD at the Guelph plant, Clean Harbors successfully implemented the PeCOD at their Bristol, Connecticut facility in 2023.

FOR MORE INFORMATION CONTACT:

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