



Ontario Municipal Water Association

Drinking Water • Wastewater • Stormwater

ONLINE

ENGAGING & INFORMING THE WATER SECTOR

WELCOME

OMWA's On The Job Training Session titled:

Be Better Informed:

Water Quality Results in Minutes

presented by W³ETAC member MANTECH Inc

will begin momentarily.

ABOUT MANTECH

Manufacturer of laboratory, online and portable analyzers for water, wastewater, soil, food and beverage analysis.

*Mission to generate the **highest quality results** in the **shortest amount of time** with the goal of enabling our customers to have significant **positive economic and sustainable impacts** on their businesses and communities.*



AGENDA

- Chemical Oxygen Demand (COD)
- Biochemical Oxygen Demand (BOD)
- Total Organic Carbon (TOC)
- PeCOD® Technology Explained
- PeCOD® Applications
- More Analysis Solutions from MANTECH



CHEMICAL OXYGEN DEMAND (COD)

- Measurement of oxygen depletion capacity of water samples contaminated with organic waste matter
- General water quality indicator
- Strong correlation to BOD
- COD by dichromate method
 - Uses hazardous chemical (e.g., dichromate, mercury, acid)
 - 3 hours to complete



BIOCHEMICAL OXYGEN DEMAND (BOD)

- Measures the potential of wastewater or other waters to deplete the oxygen level of receiving waters
- 5 day test, aka BOD5
- Wastewater treatment plants often calculate the percentage removal of BOD to determine the efficiency of their treatment process.



TOTAL ORGANIC CARBON (TOC)

- TOC is the amount of carbon-based organic contaminants in a water system.
- Does not identify specific organic contaminants present
- Absolute quantity of all carbon-bearing molecules.
- This test is typically used to estimate natural organic matter (NOM) in water

"TOC on its own sheds no light on the oxidizability of the measured carbon or the amount of oxygen needed for its biodegradation." – TOC Manufacturer

MANTECH'S PeCOD® ANALYZER

The PeCOD® analyzer offers a fast, safe and green alternative to obtain results for COD, BOD and “optimized” TOC.

- Results in 10 minutes or less
- Uses safe reagents, no dichromate or mercury
- Easy-to-use, no formal lab training required

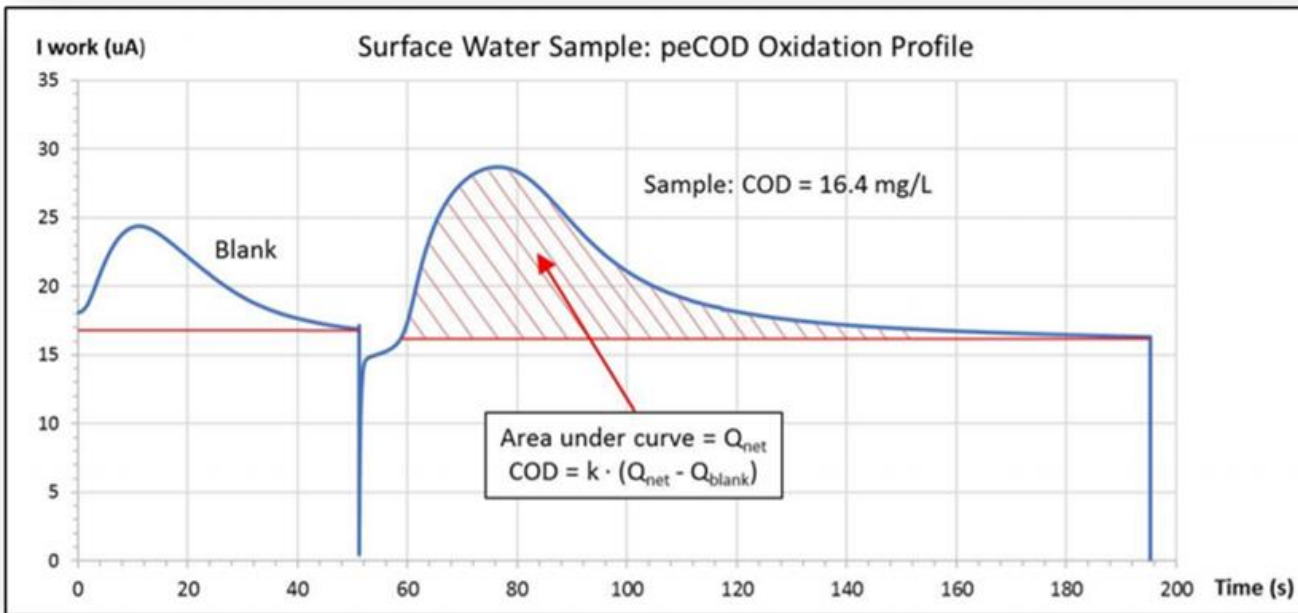
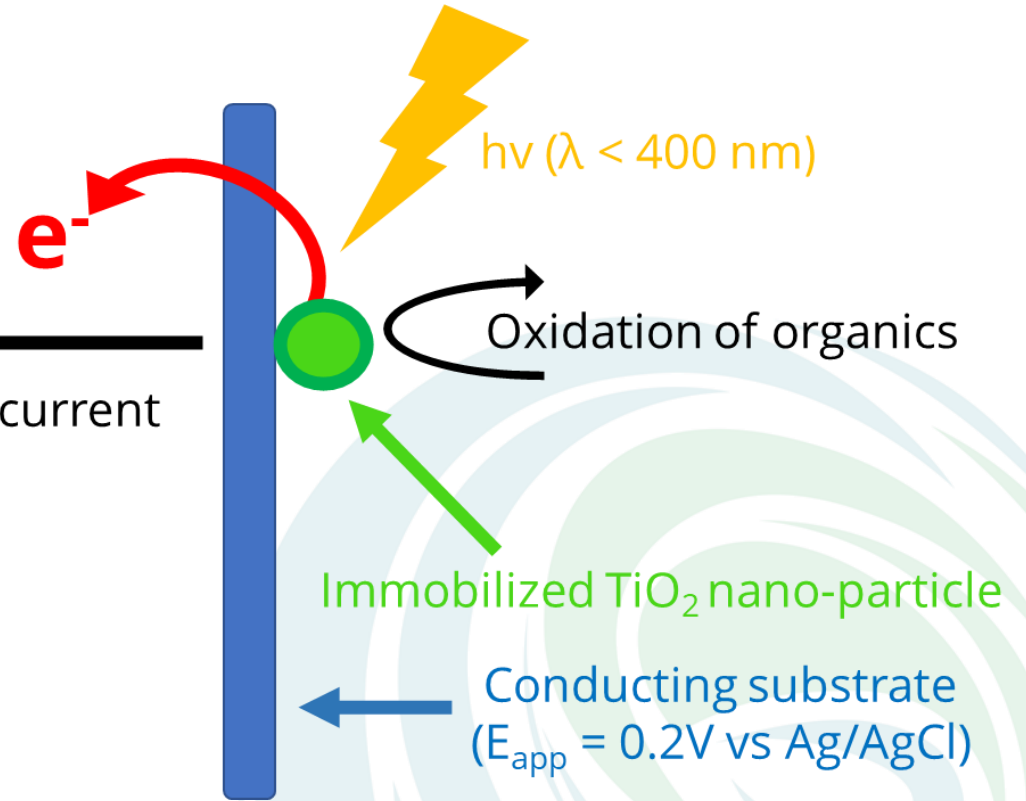


PeCOD[®] TECHNOLOGY EXPLAINED



To external circuit
and auxiliary
electrode

Photocurrent



ONE TECHNOLOGY, MULTIPLE CONFIGURATIONS



BENCHTOP



AUTOMATED



PORTABLE



ONLINE

COD & BOD APPLICATION – INDUSTRIAL WASTEWATER TREATMENT PLANT

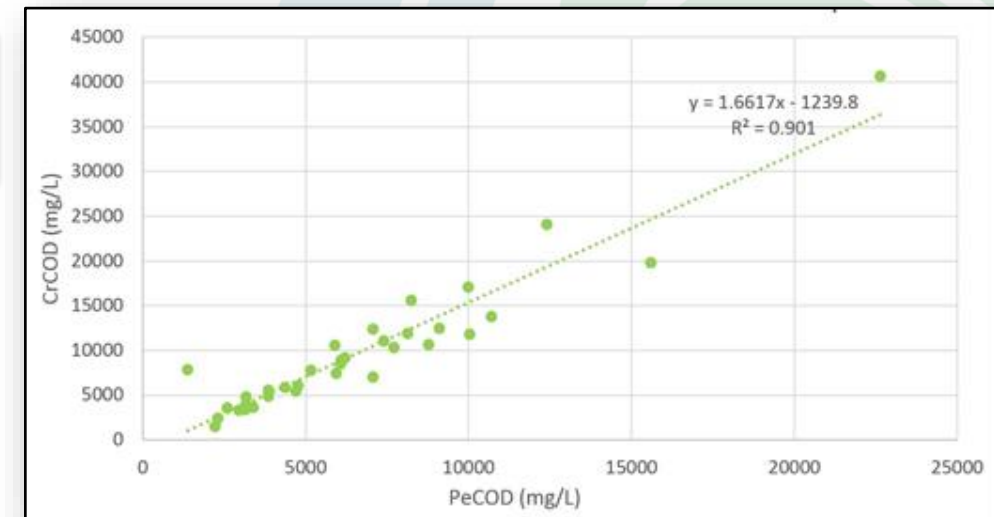
CASE STUDY: PECOD® OPTIMIZES TREATMENT OPERATIONS

Without PeCOD®	With PeCOD®
Results in 3-6 hours COD incoming 30 days BOD discharge (monthly billing)	Results in 10-minutes
Uninformed operational decision-making	Operational feedback for optimization
Unknown BOD discharge	Continuous BOD monitoring of discharge
Reduced consumption of raw materials, energy, transportation & sewer discharge costs = SAVED >\$500,000 SINCE PECOD®	

 THE **ANCHOR** OF THE PLANT!



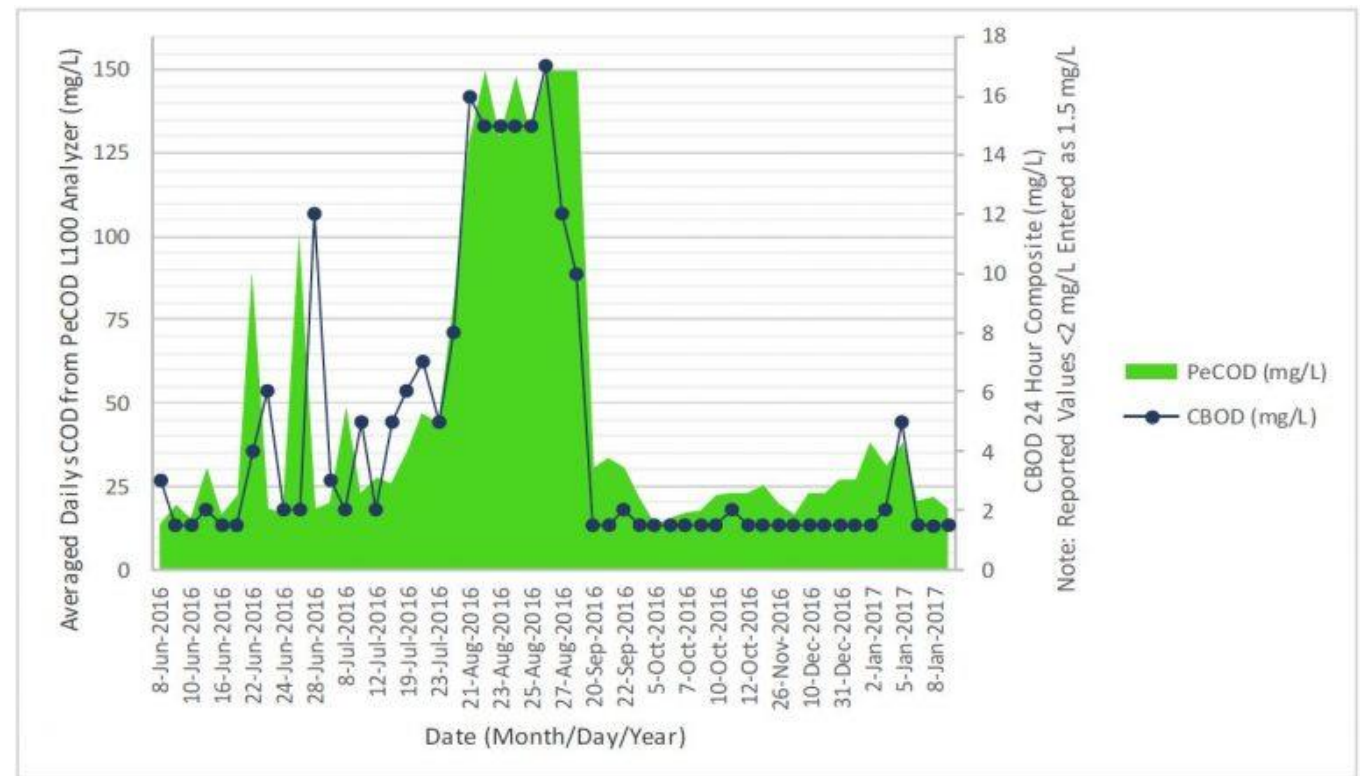
PECOD® STRONG CORRELATION TO BOD5 (SOMETIMES STRONGER THAN CODCr)



BOD APPLICATION – MUNICIPAL WASTEWATER PRIMARY EFFLUENT



- PeCOD[®] used to monitor organic load going into the activated sludge process stage of treatment
- PeCOD[®] provided real-time results of organic loading (cBOD) allowing the operators to make decisions to optimize treatment and meet discharge limits.



BOD APPLICATION – LABORATORY SETTING

- The BOD5 test requires dilutions to be done to acquire a valid result.
- Without historical data of BOD results, it can be difficult to determine the correct level of dilution needed, which results in lost time and resources.
- With PeCOD®, the Oilfield Environmental & Compliance (OEC) laboratory was able to **reduce their number of dilutions from 5 to 3 per sample.**
- PeCOD® also allows labs to provide engineers and operators with **BOD estimates same day** rather than having them wait for a week.



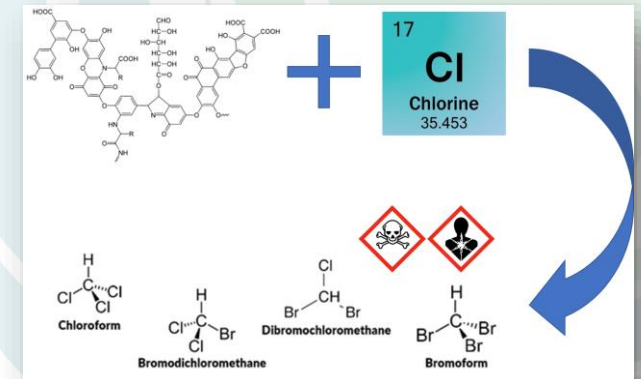


Health
Canada

GUIDANCE OF NOM IN DRINKING WATER

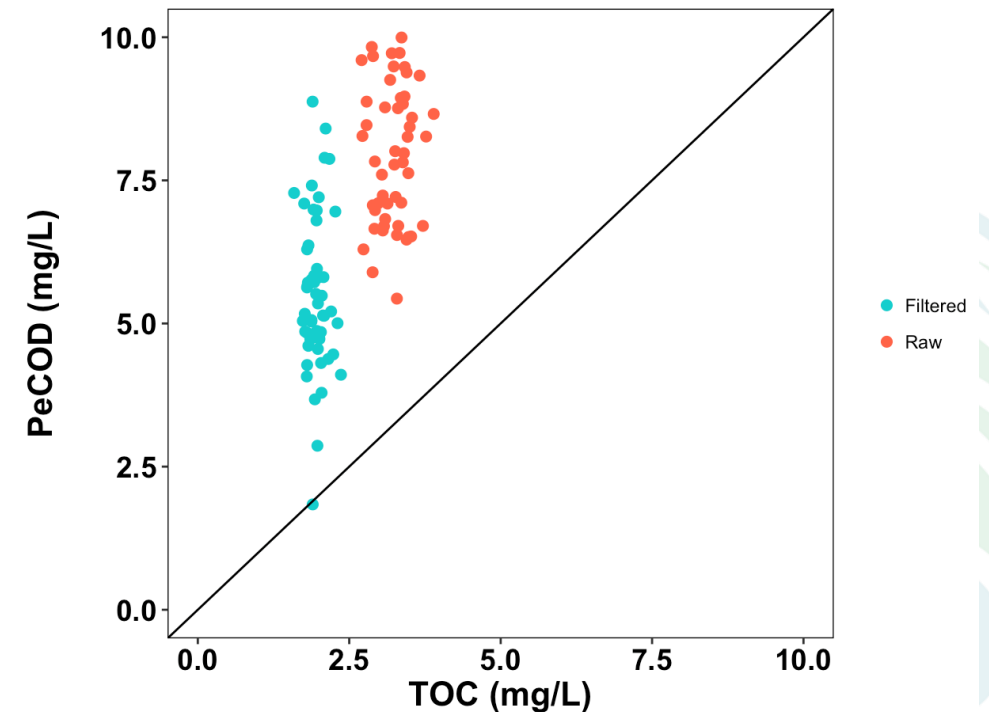
"Historically, the **chemical oxygen demand** test method (using potassium dichromate) was **not sensitive enough for drinking water** (Rittman and Huck, 1989). **More sensitive methods** have since been developed. One involves using **potassium permanganate*** as the oxidant [ISO 8467]; the other is a **photoelectrochemical oxygen demand (peCOD) method** using UV activated titanium dioxide as the oxidant (Zhao et al., 2004; ASTM, 2017)."

- Routine monitoring NOM concentration helps determine most effective treatment option to:
 - Remove NOM
 - Decrease its reactivity to form (harmful and potentially carcinogenic) DBPs
 - Reduce its potential to contribute to lead and/or copper corrosion
 - Produce biologically stable water for distribution
 - Improve color, smell and odor



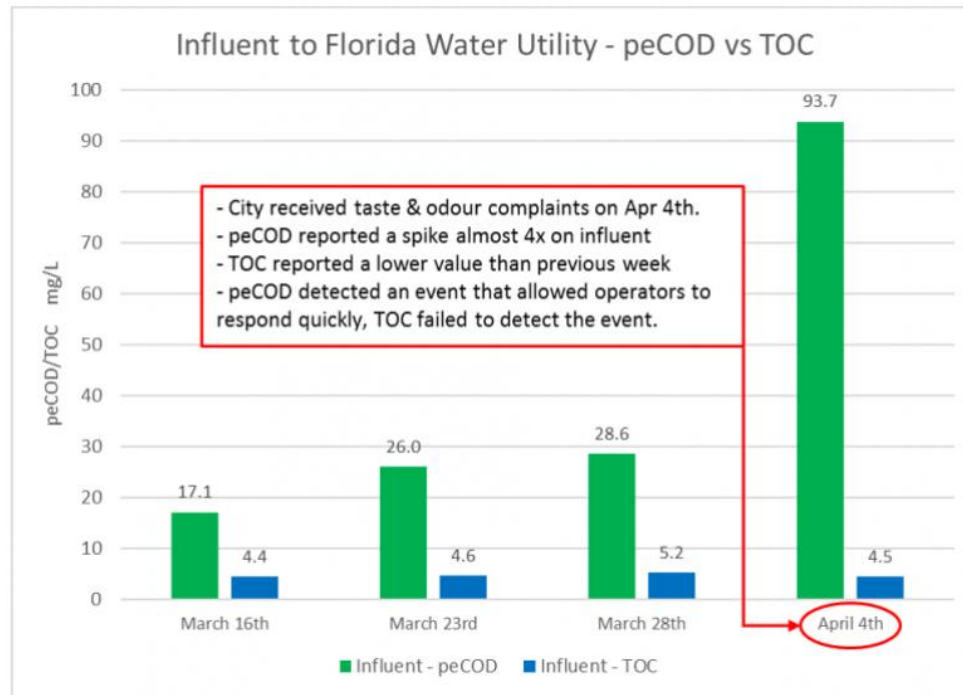
COMPARISON OF PeCOD AND TOC

- PeCOD® measures the chemical reactivity and associated oxidative changes in NOM.
- Variability of peCOD measurements is due to its **improved sensitivity vs TOC** measuring small changes in NOM not captured by TOC



TOC APPLICATION – DRINKING WATER UTILITY

CASE STUDY: PECOD® IS MORE SENSITIVE THAN TOC



peCOD vs. TOC on Influent to Florida Water Utility WTP

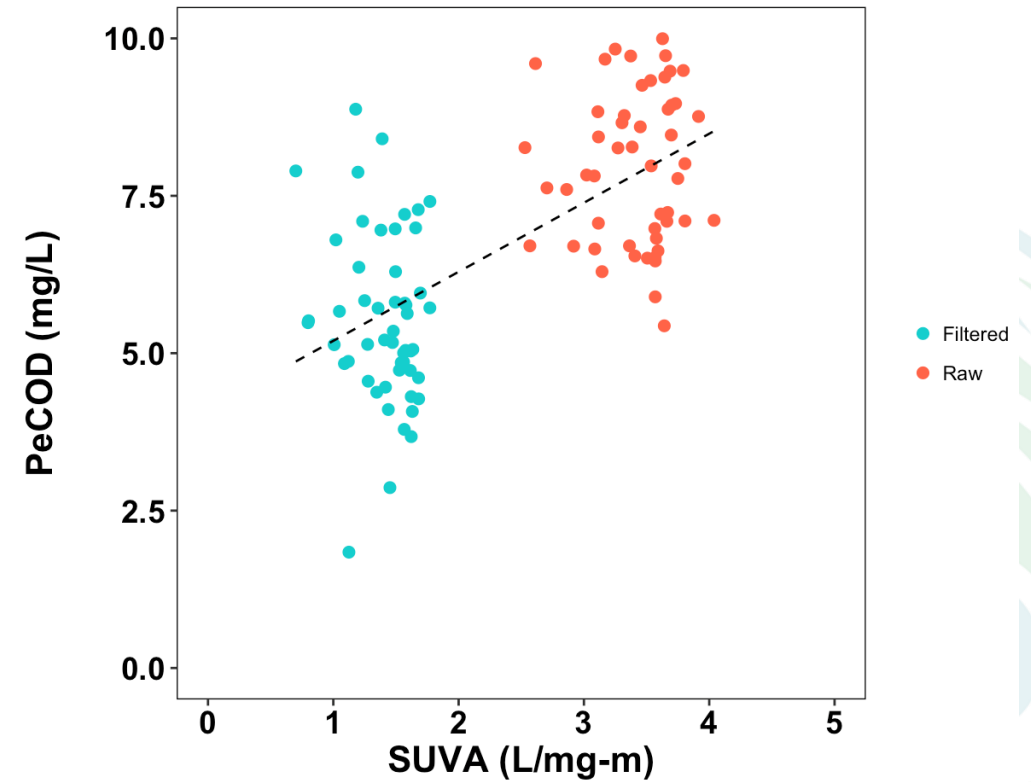
CITY RECEIVED TASTE & ODOR COMPLAINTS ON APR. 4TH

PECOD®	TOC
Results = 4x spike on influent	Results = Lower value than previous week
Detection: Passed	Detection: Failed

ALLOWED OPERATORS TO RESPOND QUICKLY!

COMPARISON OF PeCOD AND SUVA

- Specific UV absorbance, or SUVA is a test also used to measure reactivity of NOM
 - Requires 2 instruments: a UV254 analyzer and a DOC analyzer
- **PeCOD[®] acts as a “2 for 1 SUVA”**
 - Only requires 1 instrument and 1 sample to measure NOM reactivity in minutes



MORE ANALYSIS SOLUTIONS FROM MANTECH

- Titration Analysis
 - Analyze for pH, alkalinity, fluoride, chloride & more
- BOD Analysis
 - Digitize and automate the 5-day BOD test



AUTOMATED TITRATION ANALYSIS

- MT5 Autotitrator



- Automates analysis of pH, alkalinity and more using MANTECH Pro Software which features:
 - Live titration plots
 - Step-by-step instructions
 - 100,000 step buret
 - LIMS import/export capability
 - Custom shortcut buttons for routine analysis

Add an autosampler for multi-parameter titration analysis on hundreds of samples

BOD ANALYSIS

- BOD Pro Software
 - Stores and records DO readings
 - Tracks incubation periods
 - Performs calculations
 - Import/export to LIMS system
 - Includes custom shortcut buttons for routine analysis
 - Can be used with your existing DO meter



Additional automation available. Automate addition of dilution water, seed and/or inhibitor (ATU)

SUMMARY

- COD and BOD measure the amount of oxygen that is depleted by organic species in water.
- TOC is typically used for quantifying NOM however it does not measure its reactivity.
- The PeCOD® analyzer serves as a faster, safer and greener alternative to the typically methods used for COD, BOD and TOC analysis.
- Quick BOD/COD results help operators optimize their treatment process and ensure water meets discharge limits.
- PeCOD®'s increased sensitivity to changes in NOM reactivity makes it ideal for event detection and routine monitoring.

PLEASE ASK YOUR QUESTIONS NOW
OR

CONTACT MANTECH



info@mantech-inc.com



+1 (519) 763-4245

+1 (866) 763-2122 (Toll Free)



www.mantech-inc.com



OPTIMIZE YOUR RESULTS. **PROTECT OUR ENVIRONMENT.**

Thank you!

A recording of this OJT session will be available “OnDemand” for 2 weeks.

Registration is required. Approved registrants will receive an email from Zoom with the link to the recording that will require a passcode. The passcode will be provided in a separate email from admin@omwa.org.

Not an OMWA W³ETAC member? JOIN TODAY!

We encourage our non-municipal friends in the water, wastewater and stormwater industry to become members and join the collaboration. For more information, please contact us at admin@omwa.org