

A Correlation Study of Total Organic Carbon and the Five-Day Biochemical Oxygen Demand Test in Water Reclamation Plant Influent and Effluent

Thaís Bremm Pluth, Dominic A. Brose, Ashley Jesernik, Pawel Grunwald, Donna Coolidge

Monitoring and Research Department, Metropolitan Water Reclamation District of Greater Chicago (MWRDGC)*

Introduction

Total organic carbon (TOC) can be used as a replacement for the five-day biochemical oxygen demand (BOD_5) once a long-term correlation between TOC and BOD_5 is demonstrated, as stated in the Clean Water Act 40 CFR 133.104(b). TOC has many advantages including its short test time, faster data reporting, reproducibility, and automation.

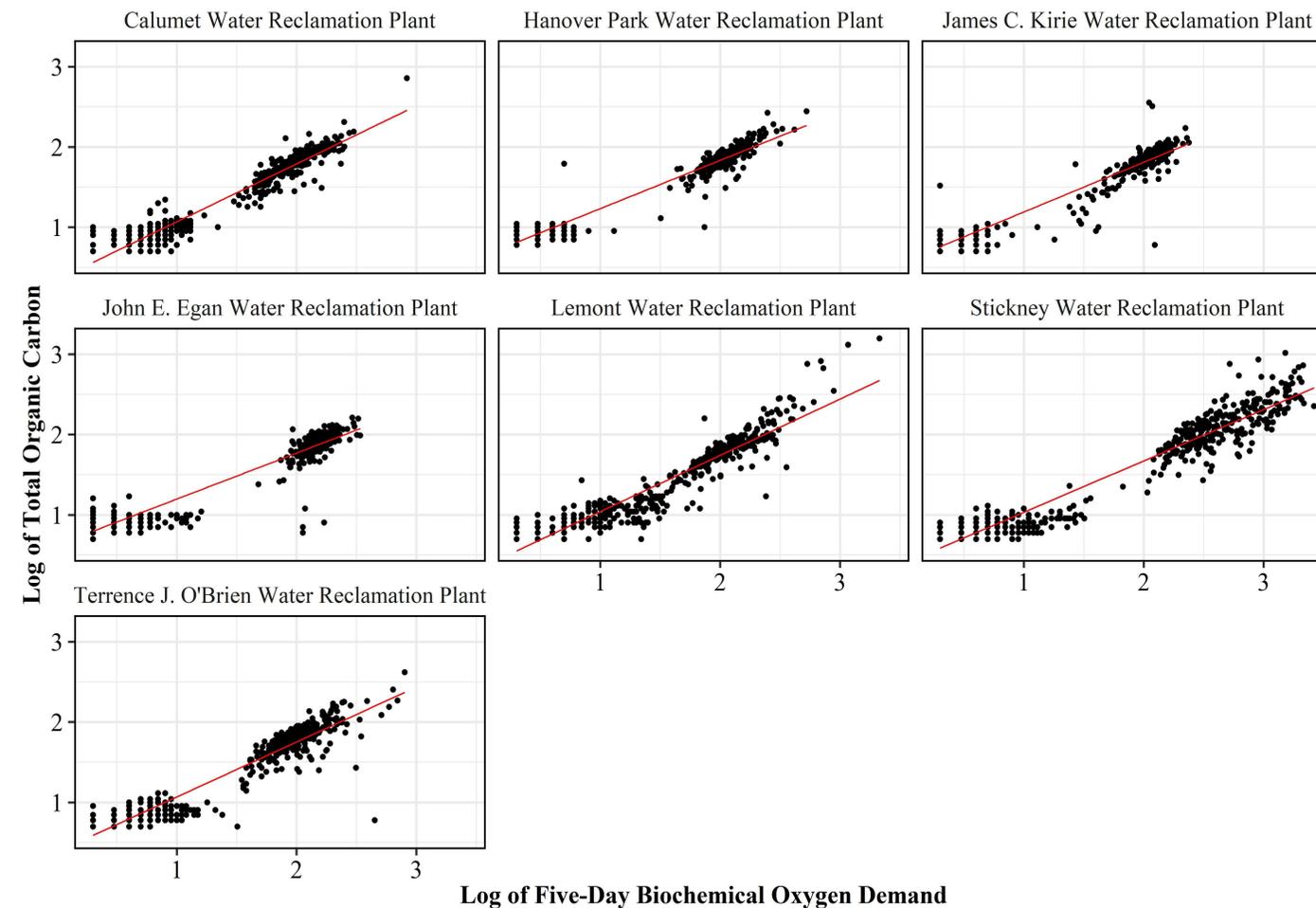
Methods

The MWRDGC conducted a one-year study to determine the correlation of TOC with BOD_5 and five-day carbonaceous biochemical oxygen demand ($CBOD_5$) for each of its seven water reclamation plants (WRPs). Influent and effluent 24-hour composite samples were collected seven days a week from the MWRDGC's three major WRPs and five days a week from the minor WRPs. All samples were analyzed for TOC, $CBOD_5$, and BOD_5 .

Results

Influent and effluent data were compiled, and statistical correlations determined. The correlation of TOC with BOD_5 and $CBOD_5$ concentrations resulted in statistically significant positive correlations with high correlation coefficients. Models developed on log10-transformed TOC, BOD_5 , and $CBOD_5$ data were observed to best describe the TOC: BOD_5 (Figure 1) and TOC: $CBOD_5$ correlations.

Figure 1: Correlation of Total Organic Carbon and the Five-Day Biochemical Oxygen Demand at the MWRDGC's Seven Water Reclamation Plants



Conclusions

We are currently in discussions with the state regulator to modify the National Pollutant Discharge Elimination System permits to report either calculated outfall $CBOD_5$ values or measured outfall TOC concentrations with new TOC permit limits. We are also determining whether to report a calculated 30-day average percent BOD_5 removal or a 30-day average percent TOC removal.

As requested by the state regulator, prior to submitting the next permit renewal application, the correlation equations developed will be verified with a new study to confirm that the current equations are still applicable.

Further information

Please contact Thaís B. Pluth at pluth@mwrd.org if you have a question or comment.

*Address: 6001 West Pershing Road, Cicero, IL, 60804