



Overload Recovery



In a typical laboratory environment, a TOC analyzer is used to measure water samples where the TOC value of those samples is unknown. Experienced operators can develop reasonable expectations about what the TOC values will be and the measurement values will tend to fall within an expected range most of the time. However, because there could be an occasional high level sample, a significant concern of anyone who operates and maintains a laboratory TOC analyzer should be:

- **What happens if we run an unknown sample which has a TOC level that is significantly higher than the upper range of the instrument specifications?**

One would expect this unwelcome surprise sample to be reported as “over range” or something similar, which should be straightforward for most TOC analyzers. The big issue of concern then becomes:

- **How quickly can the TOC analyzer recover from a very high TOC sample?**
- **Will “overloading” the analyzer require special maintenance, service, or cleaning?**

TOC Methods and Overload Recovery

Membrane

- Measurement of TOC via membrane methods relies on the selective transport of CO₂ through a membrane from the sample matrix into a separate flowing loop of water where the conductivity is measured.
- A very high level of TOC can occlude the membranes causing incomplete passage of bicarbonate ions and incorrect measurements. Recovery from such an occurrence would typically require the replacement of the membrane and a service event. Such a situation could be time consuming and expensive, preventing the TOC analyzer from being in use until it is serviced.

High Temperature Combustion

- Measurement of TOC via high temperature combustion typically relies on the use of a catalytic combustion in a furnace tube. Most manufacturers specify different catalyst loading for low TOC samples and high TOC samples. (More catalyst is used for low level samples; less is used for high TOC samples).
- If a user is utilizing the catalyst / furnace tube designed for low level samples, but gets a surprise high level sample, this can result in fouling the catalyst. Recovery from such an occurrence would then typically require replacing the catalyst and cleaning the furnace tube. Until this service is completed, the TOC analyzer would not be able to produce valid measurements.

QbD1200 (UV / Persulfate / NDIR, with One Reagent)

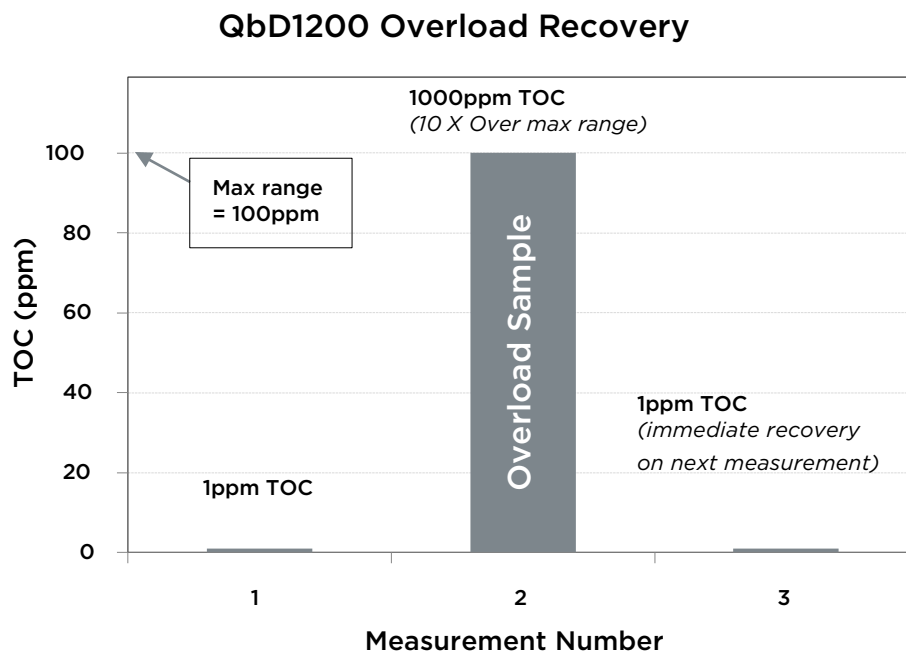
- The QbD1200 has been designed to quickly flush out such overload samples and can immediately return to normal measurement mode, providing valid results for the next sample run after an overload event.
- Even if a very high TOC sample is introduced, the glass reaction chamber is flushed out effectively after each measurement. The organic species from a very high TOC sample will be converted to CO₂ gas and pass through the detector. While the concentration of CO₂ gas would likely exceed the range of the detector, the CO₂ flows out of the detector and does no harm.
- Recovery from an Overload event requires no special service, maintenance, or cleaning.

QbD1200 Overload Recovery Data

To demonstrate this effect, an experiment was conducted using 3 prepared solutions:

- Sample 1: 1ppm TOC
- Sample 2: 1000 ppm TOC
- Sample 3: 1ppm TOC

The samples were placed in the autosampler and each sample was measured once.



Overload Recovery Notes:

- Sample Overload is a potential risk for any lab that runs unknown samples.
- Not all TOC analyzers can recover easily from a sample that has TOC levels much higher than the specified upper (max) range.
- QbD1200 can immediately recover from a sample even 10 times higher than the specified upper limit of 100ppm.