TOTAL ORGANIC CARBON in Water
EPA Method 415.1 (Combustion or Oxidation)
EPA Method 415.2 (UV Promoted, Persulfate Oxidation)
or SW-846 Method 9060

Table 1. Summary of Contract Required Detection Limits, Holding Times, and Preservation for Total Organic Carbon (TOC)

Analytical Parameter	**Contract Required Detection Limit (CRDL)**	**Technical and Contract Holding Times**	**Preservation**
Total Organic Carbon (TOC)	2.0 mg/L	UNPRESERVED Technical: 7 days from collection; Contract: 5 days from receipt at laboratory	Cool to 4EC ±2EC; protect from sunlight and atmospheric oxygen
Total Organic Carbon (TOC)	2.0 mg/L	PRESERVED Technical: 28 days from collection; Contract: 26 days from receipt at laboratory	HCl[a] or H_2SO_4 to pH <2; Cool to 4EC ±2EC; protect from sunlight and atmospheric oxygen

[a] Preserve with HCl for EPA Method 415.1 and preserve with H_2S0_4 for EPA Method 415.2. (Use of HCl may damage the instrument used for EPA Method 415.2.)
Homogenize samples as necessary.
Analyze all samples in duplicate, including laboratory quality control samples such as matrix spike and laboratory control samples (LCS). Report the average value and relative percent difference.

Data Calculations and Reporting Units:

Calculate the sample results according to EPA Method 415.1, 415.2, or SW 9060.

Report sample results in concentration units of milligram per liter (mg/L) as organic carbon. Report organic carbon concentrations that are less than 10 mg/L to 2 significant figures, and organic carbon concentrations that are greater than or equal to 10 mg/L to 3 significant figures.

For rounding results, adhere to the following rules:

a) If the number following those to be retained is less than 5, round down;
b) If the number following those to be retained is greater than 5, round up; or
c) If the number following the last digit to be retained is equal to 5, round down if the digit is even, or round up if the digit is odd.

All records of analysis and calculations must be legible and sufficient to recalculate all sample concentrations and QC results. Include an example calculation in the data package.

Table 2. Summary of Calibration Procedures for Total Organic Carbon (TOC) by EPA Methods 415.1 and 415.2, and SW-846 Method 9060

Calibration Element	**Frequency**	**Acceptance Criteria**	**Corrective Action**
Initial Calibration (minimum blank + 5 points) (ICAL)	Daily	r $ 0.995	1. Terminate analysis 2. Recalibrate and verify before sample analysis
Initial Calibration Verification (ICV) (Separate source from ICAL standards)	Daily, prior to sample analysis, immediately following ICAL	± 10% from expected concentration	1. Reprep ICV and, reanalyze all associated samples 2. Identify and document problem 3. Recalibrate and reanalyze reprepped ICV and all associated samples, if necessary
Carbonate-bicarbonate (CO_3-HCO_3) Standard	Daily, Following ICV and ICB	[a] ± 10% from expected concentration; [b] < CRDL	1. Reprep and reanalyze CO_3-HCO_3 standard 2. Identify and document problem 3. Recalibrate and reanalyze samples if necessary
Continuing Calibration Verification (CCV)	Before sample analysis; after every 10 samples and end of run	± 10% from expected concentration	1. Recalibrate and verify 2. Reanalyze samples back to last good CCV
Calibration Blank Verification (ICB, CCB)	After ICV and CCVs	< CRDL	1. Terminate analysis 2. Identify and document the problem 3. Recalibrate, verify and reanalyze all associated samples
CRDL Verification Standard (< 2X CRDL)	After initial CCV	± 20% from expected concentration	1. Reprep and reanalyze standard 2. Recalibrate and verify

[a] For instruments which subtract the inorganic concentration from the total to calculate the TOC, ± 10% from expected concentration;

[b] For instruments which acidify and sparge the inorganic carbon, a recovery of less than the CRDL is required

Dilute and reanalyze samples with TOC concentrations exceeding the range of the calibration curve. Results for such reanalyses should fall within the mid-range of the calibration curve. Report results and submit documentation for both analyses.

Table 3. Summary of Internal Quality Control Procedures for Total Organic Carbon (TOC) by EPA Methods 415.1 and 415.2 and SW-846 Method 9060

QC Element	Frequency	Acceptance Criteria	Corrective Action
Method Blank (MB)	One per Batch or SDG [a] (1 per 20 samples minimum)	< CRDL	1. If lowest sample concentration is more than 10X the blank conc., no action 2. If samples are non-detected, no action 3. If detected sample concentrations are less than 10X blank conc., all associated samples must be prepared again with another method blank and reanalyzed
Duplicate Sample (DUP)	All samples in the batch or SDG	RPD <20% for samples >5X CRDL; ± CRDL for samples <5X CRDL	1. Flag associated data with an "*"
Matrix Spike (MS)	One per batch or SDG (1 per 20 samples minimum)	± 25% from expected value [b]	1. Flag associated data with an "N"
Laboratory Control Sample (LCS)	One per batch or SDG (1 per 20 samples minimum)	± 20% from expected concentration	1. Terminate analysis 2. Identify and document the problem 3. Reanalyze all associated samples

[a] SDG - Sample Delivery Group - each case of field samples received; or each 20 field samples within a case; or each 14 calendar day period during which field samples in a case are received.

[b] An exception to this rule is granted in situations where the sample concentration exceeds the spike concentration by a factor of 4. In such an event, the data shall be reported unflagged.