

CSI acceptance criteria^a for "red-flag" stream monitoring results reported by volunteer teams on hard copy field data sheets.

	Temperature (°C)	pH ^b	Dissolved Oxygen ^c (mg/L)	Specific Conductance ^d (uS/cm)	Total Hardness ^e (mg CaCO ₃ /L)
Precision - Acceptance of Reported Duplicates	± 1°C	± 0.5 pH Units	Greater of ± 20% or 0.4 mg/L ^c	± 10%	Greater of ± 20% or 8 mg/L ^e
Accuracy - Acceptance of Reported Standards	Calibration ^f	± 0.5 pH Units	No calibration necessary ^c	± 1%	± 20% ^e
Splits - Comparison with certified lab	N/A	N/A ^b	N/A ^c	± 20% ^d	± 20% ^e

^a "Red flag" teams of two to five volunteers typically monitor five or fewer stream locations once a month. For quality control, teams are required to perform one standard and/or one duplicate, depending on the analyte. Quality controls are performed once per monitoring event. "Red flag" teams are required to split samples with CSI at the rate of one location per quarter, or four splits per year, for certified analyses of specific conductance and total hardness. In the first months of a new "red flag" monitoring program, volunteer teams are required to split one sample from every location in order to establish baselines for specific conductance and total hardness and to facilitate trouble-shooting by CSI staff if the team is having difficulty performing the tests.

^b pH is measured streamside using a wide range pH test kit accurate to 0.5 pH units over the pH range 3.0 to 10.5, LaMotte code 5858, or a hand-held meter, Hanna Instruments model HI98103. The CSI lab provides volunteer teams with an unlimited supply of pH 7.0 standard. Split samples are analyzed if requested by volunteers and if split is received by lab for analysis within 48 hours of sample collection as the frequency of spontaneous changes in pH is observed to increase after 48 hours.

^c Dissolved oxygen is measured using test kit, LaMotte code 5860-01, based on the modified Winkler method approved by EPA. Test is accurate if performed correctly. Measurement range for titrator is 0.2 – 10.0 mg/L and is readily extended to higher concentrations by continuing to add titrant until the endpoint is reached. Limit of quantitation (sensitivity) is 0.4 mg/L or two times the smallest unit of measurement on the titrator. Results are considered reportable to the limit of quantitation, assuming quality control criteria are met, consistent with certified lab protocol. At low concentrations, precision is acceptable if duplicates agree within the limit of quantitation, 0.4 mg/L. Split samples are analyzed if requested by volunteers and if split is fixed streamside and received by lab within 8 hours of sample collection, as per EPA protocol.

^d Specific conductance is measured using Hanna Instruments hand-held meter model HI 98303, range 1 to 1,999 uS/cm. CSI lab provides volunteer teams with an unlimited supply of 353 NTU specific conductance standard. Volunteer teams may hold stream samples at 4° C and perform the specific conductance test up to 28 days after sample collection, as per certified lab holding time.

^e Total Hardness is measured using LaMotte kit 4482-DR-LT-01. Measurement range for titrator is 4 to 200 mg/L as calcium carbonate equivalents (CCE) and is readily extended to higher concentrations by continuing to add titrant until the endpoint is reached. Limit of quantitation (sensitivity) is taken to be 8 mg/L CCE, or two times the smallest unit of measurement on the titrator. Results are reportable to the limit of quantitation, assuming quality control criteria are met, consistent with certified lab protocol. At low concentrations, precision is acceptable if duplicates agree within the limit of quantitation, or 8 mg/L CCE. The CSI lab provides teams with an unlimited supply of 100 mg/L CCE or 20 mg/L CCE total hardness standard, depending on sampling sites. Teams may hold samples at 4° C and perform the total hardness test up to 14 days after sample collection, as per certified lab holding time.

^f Volunteers are instructed to calibrate their thermometers based on the temperature of boiling water equal to 100°C