

Universal Definitions for Standard Operating Procedures

University of Missouri Limnology Laboratory

Prepared by: Dan Obrecht Date: 4/22/2021

Approved by: Christopher Brunet Date: 5/25/2021



Analyst	Any MU Limnology employee or student who has a general knowledge of all working methods in the lab and can compile datasheets (which have already been QCed by technicians) into final data reports. Analysts can perform final QC checks, identify additional reruns and corrective actions, and certify that data reports are ready for delivery. Although analysts must have a general knowledge of all methods used in the lab, they do not necessarily need to know how to run them themselves (e.g. an analyst may be able to certify data from a nitrate run without being trained as an operator or technician for nitrate)
Analytical Run	A set of unknown samples that are combined with Calibration Blanks, Calibration Standards, Secondary QC Samples, References, and Spiked References. All samples (environmental and QA/QC) are processed identically following lab methodologies and are analyzed together.
Calibration Curve	The curve is generated using the results of the Calibration Blank and the Calibration Standards. The Calibration Curve shows the instrumental response to an analyte, and is used to determine the concentration of the analyte in unknown samples.
Calibration Standards	A series of standards that are included with each analytical run and are used to generate a Calibration Curve used to determine analyte concentrations of unknown samples. The concentration of the standards should mimic the analytical range of the method. Calibration Standards are made from a single stock solution.
Check Standards	Are identical to the calibration standards used in the run and will be included at the end of the run.
Check Weight	A weight used to check the accuracy of analytical balances.
Coefficient of Variation	The standard deviation (SD) of replicates divided by the arithmetic mean. May be multiplied by 100 to return a percent value.
CV	Coefficient of Variation, the standard deviation (SD) of replicates divided by the arithmetic mean. May be multiplied by 100 to return a percent value.
DI	Internally plumbed deionized water provided by Culligan Commercial Water.
DOC	Dissolved organic carbon

EHS	University of Missouri Environmental Health and Safety
Environmental Sample	A water sample from a spring, stream, river, lake, reservoir, or wetland. Environmental Samples may be analyzed with no alteration allowing for the measurement of the total amount of a given analyte or filtered prior to analyses providing a measure of the total dissolved analyte concentrations.
Field Blank	An aliquot of UPDI water that is treated the same as environmental samples; including being taken into the field, short-term storage while in the field, processing and long-term storage after processing. The purpose of the Field Blank is to determine if sample handling, processing or storage are a source of contamination.
Field Duplicate	Two environmental samples, which are collected at the same time and in the same place. The two Field Duplicates are treated equally in terms of collection, storage, processing, and analyses. Results from the Field Duplicates are used to gauge the precision associated with sampling, processing, and analyses.
File name convention	Files will be named according to the following convention: "Parameter-Operator Initials- YYYY-MM-DD-Project Initials"
Laboratory Reagent Blank	A control used to rule out interferences and contaminations introduced during the analysis, or used as a sample diluent.
Method Detection Limit	The lowest concentration at which an analyte produces a signal different from zero. Method Detection Limits were determined by taking the calculated concentrations of the lowest calibration standard from multiple analytical runs (using seven or more individual values taken from at least three analytical runs) and calculating a standard deviation from those concentrations. This standard deviation is then multiplied by the one-sided t-statistic at the 99% confidence level for the appropriate degrees of freedom ($n - 1$). The result is the Method Detection Limit.
MSDS	Material Safety Data Sheet
MU EHS	University of Missouri Environmental Health and Safety

Nitrate Column Efficiency	<p>Column Efficiency is defined as the portion of a 1 mg/L nitrate standard which can be fully converted to nitrite by the column and is calculated as:</p> <p>Column Efficiency</p> $= 100 * \left(\frac{\text{Peak Area of 1 } \frac{\text{mg N}}{\text{L}} \text{ nitrate standard}}{\text{Peak Area of 1 } \frac{\text{mg N}}{\text{L}} \text{ nitrite standard}} \right)$
Operator	Any MU Limnology employee or student who has received basic training in an analytical method and is proficient enough in that method to analyze samples without supervision. Operators do not have the level of training required to QC a run and identify appropriate reruns or corrective actions.
POC	Particulate organic carbon
Positive Control	A sample with a known concentration provided by the toxin kit manufacturer. The positive control is analyzed with each run to test the accuracy of the method.
ppb	Parts per billion, 1 ppb= 1 µg/L.
PPE	Personal Protective Equipment (e.g., lab coat, gloves, eyewear, etc.).
ppm	Parts per million, 1 ppm= 1 mg/L.
Pre-combusted	550 °C for 4 h in a muffle furnace.
PSI	Pounds per Square Inch
QA	Quality Assurance
QC	Quality Control
Reference	An environmental water sample that is included in each analytical run. Analyte concentrations from the Reference samples are compared to results from previous analytical runs to ensure similar results.
Repipette	Benchtop pipette set to accurately dispense a set volume of reagent repeatedly
Sample Replicates or Triplicates	Environmental Samples are analyzed in lab in either replicates or triplicates. The number of measurements is determined in part by methodology (filter analyses are generally done in duplicates) as well as the amount of water available for analyses. Analyzing environmental samples in replicates or triplicates allows for the natural variation that can occur in environmental samples to be taken into account.
Secondary QC Standard	A standard of known concentration that is analyzed with each analytical run and is used to validate the

	calibration curve. The Secondary QC Sample is made from a different stock solution than used to make the Calibration Standards. This may be a stock solution from a different supplier or, if from the same supplier, a different chemical form.
SOP	Standard Operating Procedure
Spiked Reference	The same environmental water sample used for the Reference, with a known amount of the analyte added. Results from the Spiked Reference samples are compared to the results from Reference samples to evaluate analyte recovery in an environmental sample.
Technician	Any MU Limnology employee or student who has received training in an analytical method as well as training about how to QC analytical runs from this method. These persons can run this method unsupervised, identify reruns and needed corrective actions, and certify that data from a given run is ready to be incorporated into a final report.
TOC	Total organic carbon
Training Level	The three levels of training listed below (operator, technician, and analyst) denote the level of competency a given employee or student has with a specific method. These training levels can be acquired independently between methods (i.e., an employee does not need to be certified as chlorophyll operator, before being certified as a total nitrogen technician).
UPDI	Ultra Pure Deionized water from the Barnstead Micropure purification system. UPDI is utilized to make all reagents and should only be used if the resistance of the output is ≥ 18.0 M Ω /cm.