Basic QA/QC Concepts

Modified from *The Volunteer Monitor's Guide to Quality Assurance Project Plans*. EPA 841-B-96-003. September 1996. This guide is recommended for all citizen monitoring organizations in Virginia interested in developing a quality assurance project plan. The guide is available online at **www.epa.gov/owow/monitoring/volunteer/**.

Quality Assurance (QA)
Refers to a broad plan for maintaining quality in all aspects of a program, including all quality control measures, sample collection, sample analysis, data management, documentation, evaluation, *etc.* It is helpful to data users in determining the integrity (soundness) of data.

Quality Control (QC)
The steps, including measurements, calibrations, and standardization practices, taken to assure the quality of specific sampling and analytical procedures. QC is used to reduce error in the data collection and analysis. For example, the collection of two samples (QC samples) taken at the same time and location should yield the same (or very similar) results; data quality can be determined by evaluating the results of the QC samples and determining precision and accuracy. The decision to accept data, reject it, or accept only a portion of it should be made after analysis of the QC data.

Quality Assurance Project Plan (QAPP)
The formal written document describing the detailed quality assurance procedures and QC activities that will be used to assure data quality.

Precision
Degree of agreement among repeated measurements. Reproducible results are precise. Can be calculated using the standard deviation (a statistical way to measure variation around the data set's average value).

Accuracy
Measures how close your results are to a *true* value. The smaller the difference between the measurement and its "true" value, the more accurate the measurement. Found by analyzing a standard or reference sample (one with a known value).

Representativeness
The extent to which measurements actually depict the true condition being evaluated. For example, data collected just below a pipe outfall are not representative of the entire stream.

Completeness
The number of samples and documentation needed to meet the sampling objectives. Volunteers may not be able to collect as many samples as planned so try to take more samples than you expect to need.

Comparability
The extent to which data from one study can be directly compared to either past data obtained in the study or from data obtained in another study.

Detection Limit
In general, the lowest concentration of a given parameter your method or equipment can reliably detect and report as greater than zero. For example, if an instrument has a detection limit of 1 ppb (parts per billion) and a sample contains 0.5 ppb of lead, the sample will be "below the detection limit." Note, this does not mean the sample is free of lead (0 ppb), simply that the amount of lead is less than the instrument can detect.

Metadata
Describes the data information presented in a given dataset and quality criteria associated with their generation. Metadata is all other data collected that is not the actual value of the parameter measured. Metadata is data about the data. Metadata provides information on the procedures used, quality control measures, site locations, sample collectors, quality of the data, etc.

Standard Operating Procedures (SOPs)
Written instructions, which describe the step-by-step procedures for a process. For example, the procedures for collecting a water sample are referred to as field SOPs while the procedures for analyzing the sample in a lab are referred to as the lab SOPs.

Information provided by the **Virginia Water Monitoring Council (VWMC)**. To join the VWMC, contact **Jane Walker** at **540-231-4159** or **vwmc@vt.edu**.   A special thank you to DEQ for assistance with this handout.