

GLOSSARY OF QUALITY ASSURANCE TERMS AND RELATED ACRONYMS

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GLOSSARY OF QUALITY ASSURANCE TERMS

Absolute method: a body of procedures and techniques for which measurement is based entirely on physically defined, fundamental quantities.

Acceptable quality level: a limit above which quality is considered satisfactory and below which it is not. In sampling inspection, the maximum percentage of defects or failures that can be considered satisfactory as an average.

Acceptable quality range: the interval, between specified upper and lower limits of a sequence of values, within which the values are considered to be satisfactory.

Acceptable value: an observed or corrected value that falls within the acceptable range. See Corrected value and Observed value.

Acceptance criteria: specified limits placed on characteristics of an item, process, or service which are defined in requirements documents. (ASQC Definitions)

Acceptance sampling: the procedure of drawing samples from a lot or population to determine whether to accept or reject a sampled lot or population.

Accepted reference value: a numerical quantity that serves as an agreed-upon basis for comparison, and which is derived as; 1) a theoretical or established quantity based on scientific principles, 2) an assigned value, based on experimental work of some recognized organization, or 3) a consensus quantity based on collaborative experimental work under the auspices of a scientific or engineering group.

Accreditation: a formal recognition that an organization (e.g., laboratory) is competent to carry out specific tasks or specific types of tests. See also Certification.

The process by which an agency or organization evaluates and recognizes a program of study or an institution as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. In the context of the National Environmental Laboratory Accreditation Program (NELAP), this process is a voluntary one. (NELAC)

Accreditation criterion: a requirement that a laboratory must meet to receive authorization and approval to perform a specified task.

Accredited laboratory: a laboratory which has been evaluated and given approval to perform a specified measurement or task, usually for a specific property or analyte and for a specified period of time.

Accrediting Authority: the agency having responsibility and accountability for environmental laboratory accreditation and who grants accreditation. For the purposes of NELAC, this is EPA, other federal agencies, or the state.

Accuracy: the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator. EPA recommends that this term not be used and that precision and bias be used to convey the information usually associated with accuracy. See Precision and Bias.

Action limit: see Control limit.

Adjusted value: the observed value after adjustment for values of a blank or bias of the measurement system.

Aliquant: a subsample derived by a divisor that divides a sample into a number of equal parts but leaves a remainder; a subsample resulting from such a divisor. See Subsample.

Aliquot: a subsample derived by a divisor that divides a sample into a number of equal parts and leaves no remainder; a subsample resulting from such a division. In analytical chemistry the term aliquot is generally used to define any representative portion of the sample.

Alpha error: see "Type I Error."

Alternate method: any body of procedures and techniques of sample collection and/or analysis for a characteristic of interest which is not a reference or approved equivalent method but which has been demonstrated in specific cases to produce results comparable to those obtained from a reference method.

Analysis (chemical): the determination of the qualitative and/or quantitative composition of a substance.

Analysis duplicates: the subsection of two portions of the same prepared sample, extract or digestate to the determinative step of an analytical method or a measurement system to estimate that step's precision.

Analysis matrix spike: the subsection of a prepared sample, extract or digestate that has been fortified (spiked) with a known amount of the analyte of interest, to the determinative step of an analytical method to estimate the bias imparted by the instrumental or determinative procedure.

Analyte: the substance, a property of which is to be measured by chemical analysis.

Analytical batch: a group of samples, including quality control samples, which are processed together using the same method, the same lots of reagents, and at the same time or in continuous, sequential time periods. Samples in each batch should be of similar composition and share common internal quality control standards.

Analytical blank: see Reagent blank.

Analytical Detection Limit (LD): the smallest amount of an analyte that can be distinguished in a sample by a given measurement procedure throughout a given confidence interval (e.g., 0.95). See Method Detection Limit.

Analytical limit of discrimination: see Method detection limit.

Analytical Reagent (AR): the American Chemical Society's designation for the highest purity of certain chemical reagents and solvents. See Reagent grade.

Arithmetic mean: the sum of all the values of a set of measurements divided by the number of values in the set, usually denoted by \bar{x} ; a measure of central tendency. See Measure of central tendency.

Assessment: the evaluation process used to measure the performance or effectiveness of a system and its elements, used to denote any of the following: audit, performance evaluation, management systems review, peer review, inspection, or surveillance. ANSI/ASQC E4-1994

Assignable cause: a factor or an experimental variable shown to significantly change the quality of an effect or a result.

Audit: a systematic evaluation to determine the conformance to quantitative specifications of some operational function or activity. See Audit of data quality, Performance evaluation audit, and Technical systems audit, and also Review, and Management systems review.

Audit of data quality (ADQ): a qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality.

Audit sample: See Performance evaluation sample.

Average: see Arithmetic mean.

Background level (environmental): the concentration of substance in a defined control area during a fixed period of time before, during or after a data gathering operation.

Batch: a quantity of material (e.g., samples) of the same or similar matrix, expected to behave similarly with respect to the procedure(s) being employed and produced or processed in one operation, considered to be a uniform discrete unit.

NELAC defines **batch** as follows: environmental samples which are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A **preparation batch** is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An **analytical batch** is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples. (Quality Systems)

Batch-lot: the samples collected under sufficiently uniform conditions to be processed as a group. See Batch, Batch size.

Batch-sample: one of the samples drawn from a batch.

Batch-size: the number of samples in a batch-lot.

Beta error: see Type II Error.

Bias: the systematic or persistent distortion of a measurement process which deprives the result of representativeness (i.e., the expected sample measurement is different than the sample's true value.) A data quality indicator.

Blank: a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (AS QC, Definitions of Environmental Quality Assurance Terms, 1996)

Blank sample: a clean sample or a sample of matrix processed so as to measure artifacts in the measurement (sampling and analysis) process.

Blind sample: a subsample submitted for analysis with a composition and identity known to the submitter but unknown to the analyst and used to test the analyst's or laboratory's proficiency in the execution of the measurement process. See Double-blind sample.

Bulk sample: a sample taken from a larger quantity (lot) for analysis or recording purposes.

Calibrant: see Calibration standard.

Calibrate: to determine, by measurement or comparison with a standard, the correct value of each scale reading on a meter or other device, or the correct value for each setting of a control knob. The levels of the calibration standards should bracket the range of planned measurements. See Calibration curve.

Calibration-check: calibration material obtained from a source other than the one supplying the (primary) calibration standard, used to assess (check) the calibration of a measurement instrument; the act of assessing the calibration of a measurement instrument utilizing calibration material from a secondary source. See Span check, Mid-range check, and Zero check.

Calibration-check standard: see Calibration standard.

Calibration curve: the graphical relationship between the known values for a series of calibration standards and instrument responses.

Calibration drift: the difference between the instrument response and a reference value after a period of operation without recalibration.

Calibration standard: a substance or reference material used to calibrate an instrument.

Calibration Standard: a solution prepared from the primary dilution standard solution or stock standard solutions and the internal standards and surrogate analytes. The Calibration solutions are used to calibrate the instrument response with respect to analyte concentration.

Candidate method: a body of procedures and techniques of sample collection and/or analysis that is submitted for approval as a reference method, an equivalent method, or an alternative method.

Carrying-agent: any diluent or matrix used to entrain, dilute or to act as a vehicle for a compound of interest.

CAS#: Chemical Abstracts Service registry number of elements, chemical compounds, and certain mixtures.

Cause-effect diagram: a graphical representation of an effect and possible causes. A popular one is the Ishikawa "fish bone diagram."

Central line: the line on a control chart that represents the expected value of the control chart statistic; often the mean. See Control chart.

Certification: the process of testing and evaluation against specifications designed to document, verify, and recognize the competence of a person, organization, or other entity to perform a function or service usually for a specified time. See also Accreditation.

Certification of Data Quality: the real-time attestation that the activities of an environmental data collection operation's individual elements (e.g., sampling design, sampling, sample handling, chemical analysis, data reduction, etc.) have been carried out in accordance with the operation's requirements and that the results meet the defined quality criteria.

Certified Reference Material (CRM): a reference material that has one or more of its property values established by a technically valid procedure and is accompanied by or traceable to a certificate or other documentation issued by a certifying body. See Certification and Reference material.

Certified value: the reported numerical quantity that appears on a certificate for a property of a reference material.

Chain-of-custody: an unbroken trail of accountability that insures the physical security of samples, data and records.

Chance cause: an unpredictable, random determinant of variation of a response in a sampling or measurement operation.

Characteristic: see Property.

Check sample: an uncontaminated sample matrix spiked with known amounts of analytes usually from the same source as the calibration standards. It is generally used to establish the stability of the analytical system but may also be used to assess the performance of all or a portion of the measurement system. See also Quality control sample.

Check standard: a substance or reference material obtained from a source independent from the source of the calibration standard; used to prepare check

samples.

Chi-square test: a statistical test of the agreement between the observed frequency of events and the frequency expected according to some hypothesis.

Clean sample: a sample of a natural or synthetic matrix containing no detectable amount of the analyte of interest and no interfering material.

Coefficient of variation (CV): a measure of relative dispersion (precision.) It is equal to the ratio of the standard deviation divided by the arithmetic mean. See also Relative standard deviation.

Collaborative testing: the evaluation of an analytical method by typical or representative laboratories using subsamples prepared from a homogeneous standard sample.

Collocated sample: one of two or more independent samples collected so that each is equally representative for a given variable at a common space and time.

Collocated samplers: two or more identical sample collection devices, located together in space and operated simultaneously, to supply a series of duplicate or replicate samples for estimating precision of the total measurement system/process.

Comparability: the degree to which different methods, data sets and/or decisions agree or can be represented as similar; a data quality indicator.

Compatibility: ability of entities to be used together under specific conditions to fulfil relevant requirements. (ISO 8402)

Completeness: the amount of valid data obtained from a data collection project compared to the planned amount needed to meet the data quality objectives. Usually expressed as a percentage. A data quality indicator.

Component of variance: a part of the total variance associated with a specified source of variation.

Composite sample: a sample prepared by physically combining two or more samples having some specific relationship and processed to ensure homogeneity. See Flow-proportioned sample and Time-proportioned sample.

Confidence coefficient: the probability statement that accompanies a confidence interval and is equal to unity minus the associated type I error rate (false positive rate). A confidence coefficient of 0.90 implies that 90% of the intervals resulting

from repeated sampling of a population will include the unknown (true) population parameter. See Confidence interval.

Confidence interval: the numerical interval constructed around a point estimate of a population parameter, combined with a probability statement (the confidence coefficient) linking it to the population's true parameter value. If the same confidence interval construction technique and assumptions are used to calculate future intervals, they will include the unknown population parameter with the same specified probability. See Confidence coefficient.

Confirmation: verification of the presence of a component through the use of an analytical technique that differs from the original method. These may include:
Second column confirmation
Alternate wavelength
Derivatization
Mass spectral interpretation
Alternative detectors or
Additional cleanup procedures.

Conformity: fulfilment of specified requirements. (ISO 8402)

Control chart: a graph of some measurement plotted over time or sequence of sampling, together with control limit(s) and, usually, a central line and warning limit(s). See Central line, Control limit and limit.

Control limit: a specified boundary on a control chart that, if exceeded, indicates a process is out of statistical control, and the process must be stopped, and corrective action taken before proceeding (e.g., for a Shewhart chart the control limits are the mean plus and minus three standard deviations, i.e., the 99.72% confidence level on either side of the central line.)

Control sample: see quality control sample and Check sample.

Control standard: see Check standard.

Controlled variable: a variable that is set at a pre-selected level when a controlled experiment is conducted.

Corrective action: an action taken to eliminate the causes of an existing nonconformance, deficiency, or other undesirable situation in order to prevent recurrence. (ISO 8402)

Correlation: a measure of association between two variables. See also Correlation coefficient.

Correlation coefficient: a number between -1 and 1 that indicates the degree of linearity between two variables or sets of numbers. The closer to -1 or + 1, the stronger the linear relationship between the two (i.e., the better the correlation.) Values close to zero suggest no correlation between the two variables. The most common correlation coefficient is the product-moment, a measure of the degree of linear relationship between two variables.

Critical-toxicity range: the interval between the highest concentration at which all test organisms survive and the lowest concentration at which all test organisms die within the test period.

Customer: any individual or organization for whom items or services are furnished or work performed in response to defined requirements and expectations.

- recipient of a product provided by the supplier. (ISO 8402) Daily standard: synonym for Calibration standard.

Data: facts or figures from which conclusions can be inferred.

Data analysis: the comparison of suitably reduced data with a conceptual model (e.g., a dispersion model) and may include computation of summary statistics, standard errors, confidence intervals, tests of hypotheses, and goodness-of-fit tests.

Data Audit: a qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality (i.e., that they meet specified acceptance criteria).

Data quality: the totality of features and characteristics of data that bears on their ability to satisfy a given purpose; the sum of the degrees of excellence for factors related to data.

Data Quality Assessment (DQA): the statistical evaluation of a data set to establish the extent to which it meets user-defined application requirements (i.e., DQOs).

Data of Known Quality: data are of known quality when the qualitative and quantitative components associated with their derivation are documented appropriately for their intended use, and such documentation is verifiable and defensible.

Data quality indicators: quantitative statistics and qualitative descriptors that are used to interpret the degree of acceptability or utility of data to the user. The principal data quality indicators are bias, precision, accuracy (precision and bias are preferred), comparability, completeness, and representativeness.

Data Quality Objective (DQO): qualitative and quantitative statements of the overall level of uncertainty that a decision-maker is willing to accept in results or in decisions derived from environmental data. DQOs provide the statistical framework for planning and managing environmental data operations consistent with the data user's needs.

Data Quality Objectives process: a systematic planning tool based on the scientific method that identifies and defines the type, quality and quantity of data needed to satisfy a specified use.

Data reduction: the process of transforming the number of data items by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useful form. Data reduction is irreversible and generally results in a reduced data set and an associated loss of detail.

Data review: the systematic evaluation of achieved quality control results to establish if the samples and/or measurements performed on them meet specified acceptance criteria, for the purpose of determining whether or not the affected results may or may not be used or should be qualified.

Data set: all the observed values for the samples in a test or study; a group of data collected under similar conditions and which, therefore, can be analyzed as a whole.

Data transformation: the conversion of individual data point values into related values or symbols using formulae (reversible) or symbols (irreversible)

Data validation: See Data review/validation.

Datum: the singular of data. See Data and Value.

Decision error: applying incorrect or erroneous data in choosing between alternatives, resulting in making the wrong selection..

Defect: nonfulfilment of an intended usage requirement or reasonable expectation.
(ISO 8402)

Defensible: the ability to withstand any reasonable challenge related to the veracity or integrity of laboratory documents and derived data.

Defensible decision making: the systematic application of objective data or information in selecting between alternatives.

Degrees of freedom: the total number of items in a sample minus the number of independent relationships existing among them; the divisor used to calculate a variance term; in the simplest cases, it is one less than the number of observations.

Dependability: collective term used to describe the availability performance and its influencing factors: reliability performance, maintainability performance and maintenance-supported performance. (ISO 8402)

Dependent variable: see Response variable.

Detection limit (DL): the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level degree of confidence. See Method detection limit.

Determination: the complete analytical process of measuring the property of interest in a sample, from selecting or measuring a test portion or subsample to the reporting of results. See Test determination.

Diluent: a substance added to another to reduce the concentration and resulting in a homogeneous end product without chemically altering the compound of interest.

Dilution factor: the numerical value obtained from dividing the new volume of a diluted substance by its original volume.

Document control: the policies and procedures used by an organization to ensure that its documents and their revisions are proposed, reviewed, approved for release, inventoried, distributed, archived, stored, and retrieved in accordance with the organization's requirements.

Double-blind sample: a sample submitted to evaluate performance with concentration and identity unknown to the analyst. See Blind sample.

Duplicate: an adjective describing the taking of a second sample or performance of a second measurement or determination. Often incorrectly used as a noun and substituted for "duplicate sample." Replicate is to be used if there are more than two items. See Replicate.

Duplicate analyses or measurements: the analyses or measurements of the variable of interest performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.

Duplicate samples: two samples taken from and representative of the same population and carried through all steps of the sampling and analytical procedures in an identical manner. Duplicate samples are used to assess variance of the total method including sampling and analysis. See Collocated sample.

Dynamic blank: a sample-collection material or device (e.g., filter or reagent solution) that is not exposed to the material to be selectively captured, but is transported and processed in the same manner as the sample. See Field blank, Instrumental blank and Sampling equipment blank.

Dynamic calibration: standardization of both the measurement and collection systems using a reference material similar to the unknown. For example, a series of air-mixture standards containing sulfur dioxide of known concentrations could be used to calibrate a sulfur dioxide bubbler system.

Dynamic range: the extent over which a method can be calibrated for measuring a variable of interest.

Entity: that which can be individually described and considered. (ISO 8402)

Environmental data: measurements or information that describes environmental processes or conditions, or the performance of environmental technology.

Environmental data operations: work performed to obtain, use, or report information pertaining to environmental processes and conditions.

Environmental Detection Limit (EDL): the smallest level at which a radionuclide in an environmental medium can be unambiguously distinguished for a given confidence interval using a particular combination of sampling and measurement procedures, sample size, analytical detection limit, and processing procedure. The EDL shall be specified for the 0.95 or greater confidence interval. The EDL shall be established initially and verified annually for each method and sample matrix. (NELAC)

Environmental sample: a sample of any material that is collected from an environmental source.

Environmentally related measurement: any assessment of environmental concern generated through or for field, laboratory, or modeling processes; the value obtained from such an assessment.

Environmental technology: pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be added to process discharges (e.g., emissions, effluents)

or utilized in the ambient environment to remove pollutants or contaminants, or prevent them from entering the environment. (ANSI/ASQC E4-1994)

Equivalent method: any method of sampling and/or analysis demonstrated to result in data having a consistent and quantitatively known relationship to the results obtained with a reference method under specified conditions, and formally recognized by the EPA.

Error (measurement): the difference between an observed or corrected value of a variable and a specified, theoretically correct, or true value.

Error function: the mathematical relationship of the results obtained from the measurement of one or more properties and the error of the applied measurement process. See Normal distribution.

Experimental variable: See Independent variable.

External quality control: the activities which are routinely initiated and performed by persons outside of normal operations to assess the capability and performance of a measurement process.

False negative decision: see Type II Error.

False negative result: estimating (incorrectly) that an analyte is not present when it actually is present.

False positive decision: see Type I Error.

False positive result: estimating (incorrectly) that an analyte is present when it is actually present.

Field blank: a clean sample (e.g., distilled water), carried to the sampling site, exposed to sampling conditions (e.g., bottle caps removed, preservatives added) and returned to the laboratory and treated as an environmental sample. Field blanks are used to check for analytical artifacts and/or background introduced by sampling and analytical procedures. See Dynamic blank and Sampling equipment blank.

Field duplicates: see Duplicate sample.

Field (matrix) spike: a sample prepared at the sampling point (i.e., in the field) by adding a known mass of target analyte to a specified amount of sample. Field matrix spikes are used, for example, to determine the effect of the sample preservation, shipment, storage and sample preparation on analyte recovery

efficiency (analytical bias).

Field reagent blank: see Field blank.

Flag: to qualify or signal that an item does not meet specified requirements.

Flow rate: the quantity-per-unit time of a substance passing a point, plane, or space; for example the volume or mass of gas or liquid emerging from an orifice, pump, or turbine or moving through a point in a conduit or channel.

Field sample: see Sample.

Field split samples: two or more representative portions taken from the same sample and submitted for analysis to different laboratories to estimate interlaboratory precision.

Flag: to qualify or signal that an item does not meet specified requirements.

Flow-proportioned sample: a sample or subsample collected from a fluid system at a rate that produces a constant ratio of sample accumulation to matrix flow rate.

Fortify: synonym for Spike.

Full-scale response: the maximum output of a measurement instrument in a given range as displayed on a meter or scale.

Functional analysis: a mathematical evaluation of each component of the measurement system (sampling and analysis) in order to quantitate the error for each component. A functional analysis is usually performed prior to a ruggedness test in order to determine those variables which should be studied experimentally.

Geometric mean: the antilogarithm of the mean of the logarithms of all the values in a set.

Good laboratory practices (GLP): either general guidelines or formal regulations for performing basic laboratory operations or activities that are known or believed to influence the quality and integrity of the results.

Goodness-of-fit: the measure of agreement of the values in a data set and the expected or hypothesized ones. the application of the chi-square distribution in comparing the frequency distribution of a statistic observed in a sample with the expected frequency distribution based on some theoretical model.

Grab sample: a single sample which is collected at one point in time and place.

Grade: the category or rank given to entities having the same functional use but different requirements for quality. (ISO 8402)

Graded approach: the process of basing the level of application of managerial controls applied to an item or work according to the intended use of the results and the degree of confidence needed in the quality of the results (See Data Quality Objectives). (U.S. DOE Order 5700.6C, *Quality Assurance*).

Gross sample: see Bulk sample.

Guidance: suggested practice that is not mandatory, intended as an aid or example in complying with a standard or requirement. (*ASQC Definitions of Environmental Quality Assurance Terms*, 1996).

Holding time: the period a sample may be stored prior to its required analysis. While exceeding the holding time does not necessarily negate the veracity of analytical results, it causes the qualifying or flagging of the data for not meeting all of the specified acceptance criteria. The maximum times that samples may be held prior to analysis and still be considered valid. (40 CFR Part 136).

Homogeneity: the degree of uniformity of structure or composition.

Hypothesis (statistical): a *tentative* statement about one or more parameters of a population or group of populations

- an unproved theory, proposition, supposition, etc. tentatively accepted to explain certain facts or to provide a basis for further investigation.

Hypothesis testing: the application of statistical tests to enable an informed decision between the null - and the alternative hypothesis.

In-control: a condition indicating that performance of the quality control system is within the specified control limits, i.e., that a stable system of chance is operating and resulting in statistical control. See Control chart.

Independent variable: see Controlled variable.

Initial Demonstration of Analytical Capability: the procedure for establishing a laboratory's ability to generate the measurement accuracy and precision required by many of the EPA's analytical methods. In general the procedure includes the addition of a specified concentration of each analyte (using a QC check sample) in each of four separate aliquots of laboratory pure water. These are carried through the entire analytical procedure and the percentage recovery and the

standard deviation are determined and compared to specified QC acceptance limits. (40 CFR Part 136).

Inspection criterion: the specification(s) and rationale for rejecting and accepting samples in a particular sampling plan.

Instrument blank: a clean sample processed through the instrumental steps of the measurement process; used to assess instrument contamination. See Dynamic blank.

Interference: a positive or negative effect on a measurement caused by a variable other than the one being investigated.

Interference equivalent: the mass or concentration of a foreign substance which gives the same measurement response as one unit of mass or concentration of the substance being measured.

Interlaboratory calibration: the process, procedures, and activities for standardizing a given measurement system to ensure that laboratories participating in the same program can produce comparable data.

Interlaboratory method validation study (IMVS): the formal study of a sampling and/or analytical method, conducted with replicate, representative matrix samples, following a specific study protocol and utilizing a specific written method, by a minimum of seven laboratories, for the purpose of estimating interlaboratory precision, bias and analytical interferences.

Interlaboratory precision: a measure of the variation, usually given as the standard deviation, among the test results from independent laboratories participating in the same test.

Interlaboratory test: a test performed by two or more laboratories on the same material for the purpose of assessing the capabilities of an analytical method or for comparing different methods.

Internal quality control: see Intralaboratory quality control.

Internal standard: a known amount of a standard added to a test portion of a sample and carried through the entire determination procedure as a reference for calibrating and controlling the precision and bias of the applied analytical method.

Intralaboratory quality control: the routine activities and checks, such as periodic calibrations, duplicate analyses and spiked samples, that are included in normal internal procedures to control the accuracy and precision of measurements.

Intralaboratory precision: a measure of the method/sample specific analytical variation within a laboratory; usually given as the standard deviation estimated from the results of duplicate/replicate analyses. See also Standard deviation and Variance.

Laboratory accreditation: see Accredited laboratory and Accreditation.

Laboratory blank: see Reagent blank.

Laboratory control sample (however named, such as laboratory fortified blank, spiked blank): an uncontaminated sample matrix spiked with known amounts of analytes from a source independent of the calibration standards. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. (Glossary of Quality Assurance Terms, QAMS, 8/3 1/92).

Laboratory duplicates: synonym for Duplicate analyses. Aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently.

Laboratory performance check solution: a solution of method and surrogate analytes and internal standards; used to evaluate the performance of the instrument system against defined performance criteria.

Laboratory replicates: see Replicate analysis or measurement.

Laboratory spiked blank: see Spiked laboratory blank.

Laboratory spiked sample: see Spiked sample.

Laboratory splits or split samples: two or more representative portions taken from the same sample and analyzed by different laboratories to estimate the interlaboratory precision or variability and data comparability.

Laboratory sample: a subsample of a field, bulk or batch sample selected for laboratory analysis.

Least squares method: a technique for estimating model coefficients which minimizes the sum of the squares of the differences between each observed value and its corresponding predicted value derived from the assumed model.

Limit of detection (LOD): The lowest concentration level that can be determined (by a single analysis and with a defined level of confidence,) to be statistically different

from a blank. [Analytical Chemistry, 55, p. 2217, December, 1983, modified] See also Method Detection Limit.

Limit of quantification (LOQ): the concentration of analyte in a specific matrix for which the probability of producing analytical values above the method detection limit is 99 percent.

Linearity: the degree of agreement between the calibration curve of a method and a straight line assumption.

Lot: a number of units of an article or a parcel of articles offered as one item; commonly, one of the units, such as a sample of a substance under study. See Batch.

Lot size: the number of units in a particular lot. See Batch lot and Batch size.

Lower control limit: see Control limit.

Lower warning limit: see Warning limit.

Management review: formal evaluation by top management of the status and adequacy of the quality system in relation to quality policy and objectives. (ISO 8402)

Management system: a structured nontechnical system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for conduction work and producing items and services. (ANSI/ASQC E4-1994)

Management Systems Review (MSR): the qualitative assessment of a data collection operation and/or organization(s) to establish whether the prevailing quality management structure, practices, and procedures are adequate for ensuring that the type and quality of data needed and expected are obtained. See Review and Audit

Matrix: a specific subset of a medium (e.g., surface water, drinking water, kaolinite) in which the analyte of interest may be contained. Matrices may be defined/differentiated by their behavior: samples of the same or similar matrix are expected to behave the same or similarly with respect to the procedure(s) employed on them. See Medium.

For NELAC: The component or substrate which contains the analyte of interest. For purposes of batch determination, the following matrix types shall be used:

- Aqueous: Any aqueous sample excluded from the definition of a

drinking water matrix or Saline/Estuarine source. Includes surface water, groundwater and effluents.

- Drinking water: Any aqueous sample that has been designated a potable or potential potable water source.
- Saline/Estuarine: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.
- Non-aqueous liquid: Any organic liquid with <15% settleable solids.
- Biological Tissue: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.
- Solids: Includes soils, sediments, sludges and other matrices with >15% settleable solids.
- Chemical Waste: A product or by-product of a industrial process that results in a matrix not previously defined.
- Air Samples: Media used to retain the analyte of interest from an air sample such as sorbent tubes or summa canisters. Each medium shall be considered as a distinct matrix. (Quality Systems)

Matrix spike: see Spiked sample.

Matrix spike duplicate sample analysis: see Matrix, Duplicate analysis and Spiked sample.

Maximum contaminant level: the highest permissible concentration of a pollutant that may be delivered to any receptor.

Maximum holding time: the length of time a sample can be kept under specified conditions without undergoing significant degradation of the analyte(s) or property of interest.

May: permitted but not required. (TRADE)

Mean: see Arithmetic mean.

Measurement range: the range over which the precision and/or recovery of a measurement method are regarded as acceptable. See Acceptable quality range.

Measurement standard: a standard added to the prepared test portion of a sample (e.g. to the concentrated extract or the digestate) as a reference for calibrating and controlling measurement or instrumental precision and bias.

Measurement system: those elements of a data collection project comprised of the sampling process, the analytical method(s), the quality control and instrument calibration requirements, and its data acquisition and management requirements.

Measure of central tendency: a statistic that describes the grouping of values in a data set around some common value (e.g., the median, arithmetic mean, or geometric mean.)

Measure of dispersion: a statistic that describes the variation of values in a data set around some common value. See Coefficient of variation, Range, Variance and Standard deviation.

Medium: a substance (e.g., air, water, soil) which serves as a carrier of the analytes of interest. See Matrix.

Medium blank: see Field blank and/or Laboratory blank.

Median: the middle value for an ordered set of n values; represented by the central value when n is odd or by the mean of the two most central values when n is even.

Method: a body of procedures and techniques for performing a task (e.g., sampling, characterization, quantification) systematically presented in the order in which they are to be executed.

Method blank: a clean sample processed simultaneously with and under the same conditions as samples containing an analyte of interest through all steps of the analytical procedure.

Method check sample: see Spiked laboratory blank.

Method detection limit (MDL): the minimum concentration of an analyte that, in a given matrix and with a specific method, has a 99% probability of being identified, qualitatively or quantitatively measured, and reported to be greater than zero. See Detection limit.

Method of least squares: see Least squares method.

Method performance study: see Interlaboratory method validation study.

Method quantification limit (MQL): see Limit of quantification and also Method detection limit.

Mid-range check: a standard used to establish whether the middle of a measurement method's calibrated range is still within specifications.

Minimum detectable level: see Method detection limit.

Mixed waste: Hazardous waste material as defined by 40 CFR, Part 261 (RCRA) and mixed with radioactive waste, subject to the requirements of the Atomic Energy Act. (ANSI/ASQC E4-1 994)

Mode: the most frequent value or values in a data set.

Multipoint calibration: the determination of correct scale values by measuring or comparing instrument responses at a series of standardized analyte concentrations; used to define the range for generating quantitative data of acceptable quality.

Must: denotes a requirement that must be met. (Random House College Dictionary)

Negative controls: measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.

NELAC: National Environmental Laboratory Accreditation Conference. A voluntary organization of state and federal environmental officials and interest groups purposed primarily to establish mutually acceptable standards for accrediting environmental laboratories. A subset of NELAP. (NELAC)

NELAP: the overall National Environmental Laboratory Accreditation Program of which NELAC is a part.

Noise: the sum of random errors in the response of a measuring instrument.

Nonconformity: nonfulfillment of a specified requirement. (ISO 8402)

Normal distribution: an idealized probability density function that approximates the distribution of many random variables associated with measurements of natural phenomena and takes the form of a symmetric "bell-shaped curve."

Objective evidence: information which can be proven true, based on facts obtained through observation, measurement, test or other means. (ISO 8402)

Observation: a fact or occurrence that is recognized and recorded.

Observed value: the magnitude of a specific measurement; a variable; a unit of space, time or quantity; a datum. The observed value is that reported before correction for a blank value. See Corrected value.

Organization: company, corporation, firm enterprise or institution, or part thereof, whether incorporated or not, public or private, that has its own functions and

administration. (ISO 8402)

Organizational structure: responsibilities, authorities and relationships, arranged in a pattern, through which an organization performs its functions. (ISO 8402)

Outlier: an observed value that appears to be discordant from the other observations in a sample. One of a set of observations that appears to be discordant from the others. The declaration of an outlier is dependent on the significance level of the applied identification test. See also Significance level.

Parameter: any quantity such as a mean or a standard deviation characterizing a population. Commonly misused for "variable", "characteristic" or "property."

Peer review: the documented critical evaluation of projects generally beyond the state of the art or characterized by potential uncertainty, conducted to ensure that activities are technically adequate, competently performed, properly documented, and satisfy established technical and quality requirements. The peer review is conducted by qualified individuals or organizations independent of, but collectively equivalent to those who performed the original work.

Percentage standard deviation: synonym for Relative standard deviation.

Performance Based Measurement System (PBMS): a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting appropriate methods to meet those needs in a cost-effective manner.

Performance evaluation audit: a type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of an analyst or laboratory.

Performance evaluation sample (PE sample): a sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified performance limits. See Blind sample and Performance evaluation audit.

Population: all possible items or units which possess a variable of interest and from which samples may be drawn.

- the totality of items or units of material under consideration. (ANSI/ASQC AI-1978)

Positive controls: measures taken to ensure that a test and/or its components are

working properly and producing correct or expected results from positive test subjects.

Precision: the degree to which a set of observations or measurements of the same property, usually obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. See also Standard deviation and Variance.

Preservation: refrigeration and or reagents added at the time of sample collection to maintain the chemical and or biological integrity of the sample.

Preventative maintenance: an orderly program of activities designed to ensure against equipment failure.

Primary reference standard: see Primary standard.

Primary standard: a substance or device, with a property or value that is unquestionably accepted (within specified limits) in establishing the value of the same or related property of another substance or device.

Probability: a number between zero and one inclusive, reflecting the limiting proportion of the occurrence of an event in an increasingly large number of identical trials, each of which results in either the occurrence or nonoccurrence of the event.

Probability sampling: sampling in which: (a) every member of the population has a known probability of being included in the sample; (b) the sample is drawn by some method of random selection consistent with these probabilities; and the known probabilities of inclusion are used in forming estimates from the sample. The probability of selection need not be equal for members of the population.

Procedure: a set of systematic instructions for performing an activity.

- specified way to perform an activity. (ISO 8402)

Process: set of inter-related resources and activities which transform inputs into outputs. (ISO 8402)

Proficiency Test Sample (PT): a sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified performance limits. (Glossary of Quality Assurance Terms, QAMS, 8/31/92).

Proficiency Testing: Determination of the laboratory calibration or testing performance

by means of interlaboratory comparisons. (ISO/IEC Guide 2 - 12.6, amended) A systematic program in which one or more standardized samples is analyzed by one or more laboratories to determine the capability of each participant.

Proficiency Testing Program: the aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results in comparison to peer laboratories and the collective demographics and results summary of all participating laboratories.

Property: a quality or trait belonging and peculiar to a thing; a response variable is a measure of a property. Synonym for Characteristic.

Protocol: a detailed written procedure for a field and/or laboratory operation (e.g., sampling, analysis) which must be strictly adhered to.

Pure Reagent Water: shall be ASTM Type I or Type II water in which no target analytes or interferences are detected as required by the analytical method.

Qualified: status given to an entity when toe capability of fulfilling specified requirements has been demonstrated. (ISO 8402)

Qualitative (determination or analysis): the identification of a sample, material, compound or element without any certainty as to its mass, volume or amount. Qualitative results are generally expressed as the presence or absence of a material and are usually not accompanied by confidence statements.

Quality: the sum of features and properties/characteristics of a product or service that bear on its ability to satisfy stated or implied needs.

- The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs. (ISO 8402)
- The consistent conformance of a product or service to a given set of standards or expectations. (ISO-9000)

Quality (assurance) assessment: the evaluation of environmental data, comprised of data validation/verification and data quality assessment, to establish whether they meet the quality criteria needed for a specific application.

Quality assurance (QA): an integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.

Quality Assurance Narrative Statement: a description of the quality assurance and quality control activities to be followed for a research project.

Quality Assurance Objectives: the limits on bias, precision, comparability, completeness and representativeness defining the minimal acceptable levels of performance as determined by the data user's acceptable error bounds.

Quality Assurance Project Plan (QAPP): a formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved.

Quality audit: systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives. (ISO 8402)

Quality Circle: a small group of individuals from an organization or unit who have related interests and meet regularly to consider problems or other matters related to the quality of the product or process.

Quality control (QC): the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. The aim is to provide quality that is satisfactory, adequate, dependable, and economical.

- operational techniques and activities that are used to fulfil requirements for quality. (ISO 8402)

Quality control chart: see Control chart.

Quality control check sample: see Calibration standard.

Quality control sample: an uncontaminated sample matrix spiked with known amounts of analytes from a source independent from the calibration standards. It is generally used to establish Intralaboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. See also Check sample.

Quality improvement: actions taken throughout the organization to increase the effectiveness and efficiency of activities and processes in order to provide added benefits to both the organization and its customer. (ISO 8402)

Quality loop: conceptual model of interacting activities that influence quality at the various stages ranging from the identification of needs to the assessment of whether these needs have been satisfied. (ISO 8402)

Quality management: all activities of the overall management function that determine the quality policy, objectives and responsibilities, and implement them by means such as quality planning, quality control, quality assurance, and quality improvement within the quality system. (ISO 8402)

Quality Management Plan (QMP): a formal document describing the management policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an agency, organization or laboratory for ensuring quality in its products and utility to its users.

Quality planning: activities that establish the objectives and requirements for quality and for the application of quality system elements. (ISO 8402)

Quality policy: overall intentions and direction of an organization with regard to quality as formally expressed by top management. (ISO 8402)

Quality system: a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

- organizational structure, procedures, processes, and resources needed to implement quality management. (ISO 8402)

Quantitation limits: the maximum-or minimum levels or quantities of a target variable that can be quantified with the confidence level required by the data user.

Quantitative (determination or analysis): the relatively accurate measurement of the amounts or percentages of one or more components of a sample or material. Depending on the QC operations performed in support of the analysis, qualitative results may be reported with or without estimates of variability.

Random: lacking a definite plan, purpose or pattern; due to chance.

Random error: the deviation of an observed value from a true value, which behaves like a variable in that any particular value occurs as though chosen at random from a probability distribution of such errors. The distribution of random error is generally assumed to be normal.

Random sample or subsample: a subset of a population or a subset of a sample, selected according to the laws of chance with a randomization procedure.

Random variable: a quantity which may take any of the values of a specified set with a specified relative frequency or probability. It is defined by a set of possible values, and by an associated probability function giving the relative frequency of occurrence of each possible value.

Randomization: the arrangement of a set of objects in a random order; a set of treatments applied to a set of experimental units is said to be randomized when the treatment applied to any given unit is chosen at random from those available and not already allocated.

Randomness: a basic statistical concept and property implying an absence of a plan, purpose or pattern, or of any tendency to favor one outcome rather than another.

Range: the difference between the minimum and the maximum of a set of values.

Raw data: any original factual information from a measurement activity or study recorded in laboratory worksheets, records, memoranda, notes, or exact copies thereof and that are necessary for the reconstruction and evaluation of the report of the activity or study. Raw data may include photographs, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments. If exact copies of raw data have been prepared (e.g., tapes which have been transcribed verbatim, dated, and verified accurate by signature), the exact copy or exact transcript may be substituted.

Readiness review: a systematic, documented review of the readiness for start-up or continued use of a facility, process, or activity. Readiness reviews are typically conducted before proceeding beyond project milestones and prior to initiation of a major phase of work. (ANSI/ASQC E4-94)

Reagent blank: a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps to error in the observed value.

Reagent grade: the second highest purity designation for reagents which conform to the current specifications of the American Chemical Society Committee on Analytical Reagents.

Records system (or plan): a written, documented group of procedures describing required records, steps for producing them, storage conditions, retention period and circumstances for their destruction or other disposition.

Recovery efficiency: in an analytical method, the fraction or percentage of a target

analyte extracted from a sample containing a known amount of the analyte.

Reference material: a material or substance, one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or assigning values to materials.

Reference method: a sampling and/or measurement method which has been officially specified by an organization as meeting its data quality requirements.

Reference standard: a standard, generally of the highest metrological quality available at a given location, from which measurements made at that location are derived. (VIM - 6.08). See also Calibration standard.

Relative standard deviation: the standard deviation expressed as a percentage of the mean recovery, i.e., the coefficient of variation multiplied by 100.

Reliability: the likelihood that an instrument or device will function under defined conditions for a specified period of time.

Repeatability: the degree of agreement between mutually independent test results produced by the same analyst using the same test method and equipment on random aliquots of the same sample within a short period of time.

Replicability: see Repeatability.

Replicate: an adjective or verb referring to the taking of more than one sample or to the performance of more than one analysis. Incorrectly used as a noun in place of replicate analysis. Replicate is to be used when referring to more than two items. See Duplicate.

Replicate analyses or measurements: the analyses or measurements of the variable of interest performed identically on two or more subsamples of the same sample within a short time interval. See Duplicate analyses or measurements.

Replicate samples: two or more samples representing the same population characteristic, time, and place, which are independently carried through all steps of the sampling and measurement process in an identical manner. Replicate samples are used to assess total (sampling and analysis) method variance. Often incorrectly used in place of the term "replicate analysis." See Duplicate samples and Replicate analysis.

Representative sample: a sample taken so as to reflect the variable(s) of interest in the population as accurately and precisely as specified. To ensure representativeness, the sample may be either completely random or stratified

depending upon the conceptualized population and the sampling objective (i.e., upon the decision to be made.)

Representativeness: the degree to which data accurately and precisely represent the frequency distribution of a specific variable in the population; a data quality indicator.

Reproducibility: the extent to which a method, test or experiment yields the same or similar results when performed on subsamples of the same sample by different analysts or laboratories.

Requirement: a formal statement of a need and the expected manner in which it is to be met. The translation of a need into a set of individual quantified or descriptive specifications of the characteristics of an entity in order to enable its realization and examination.

Requirements for quality: expressions of the needs or their translation into a set of quantitatively or qualitatively stated requirements for the characteristics of an entity to enable its realization and examination. (ISO 8402)

Response variable: a variable that is measured when a controlled experiment is conducted.

Result: the product of a calculation, test method, test or experiment. The result may be a value, data set, statistic, tested hypothesis or an estimated effect.

Review: the assessment of management/operational functions or activities to establish their conformance to qualitative specifications or requirements. See Management systems review and also, Audit.

Rework: action taken on a nonconforming product so that it will fulfil the specified requirements. (ISO 8402)

Rinsate blank: the solvent used to rinse a container or sampling apparatus. Rinsate blanks are generally subjected to analysis to determine whether a container or sampler is free of contamination.

Risk: the probability or likelihood of an adverse effect.

Risk (statistical): the expected loss due to the use of a given decision procedure.

Robustness: (in)sensitivity of a statistical test method to departures from underlying assumptions. See Ruggedness.

Rounded number: a number, reduced to a specified number of significant digits or decimal places using defined criteria.

Round-robin study: a method validation study involving an undefined number of laboratories or analysts, all analyzing the same sample(s) by the same method. In a round-robin study all results are compared and used to develop summary statistics such as interlaboratory precision and method bias or recovery efficiency.

Routine method: a defined plan of procedures and techniques used regularly to perform a specific task.

Ruggedness: the (in)sensitivity of an analytical test method to departures from specified analytical or environmental conditions. See Robustness.

Ruggedness testing: the carefully ordered testing of an analytical method while making slight variations in test conditions (as might be expected in routine use) to determine how such 30 variations affect test results. If a variation affects the results significantly, the method restrictions are tightened to minimize this variability.

Sample: a part of a larger whole or a single item of a group; a finite part or subset of a statistical population. A sample serves to provide data or information concerning the properties of the whole group or population.

Sample data custody: see Chain-of-custody.

Sample variance (statistical): a measure of the dispersion of a set of values. The sum of the squares of the difference between the individual values of a set and the arithmetic mean of the set, divided by one less than the number of values in the set. (The square of the sample standard deviation.) See also Measure of dispersion.

Sampling: the process of obtaining a representative portion of the material of concern.

Sampling equipment blank: a clean sample that is collected in a sample container with the sample-collection device and returned to the laboratory as a sample. Sampling equipment blanks are used to check the cleanliness of sampling devices. See Dynamic blank.

Sampling error: the difference between an estimate of a population value and its true value. Sampling error is due to observing only a limited number of the total possible values and is distinguished from errors due to imperfect selection, bias in response, errors of observation, measurement or recording, etc. See also Probability sampling.

Scheduled maintenance: see Preventative maintenance.

Screening test: a quick test for coarsely assessing a variable of interest.

Secondary standard: a standard whose value is based upon comparison with a primary standard.

Selectivity (analytical chemistry): the capability of a method or instrument to respond to a target substance or constituent in the presence of nontarget substances.

Semiquantitative: the presence or absence of one or more members of a class or group of substances, compounds, etc., all of which produce the same or similar response from the detection/measurement system.

Semiquantitative: the relatively inaccurate (e.g., within one order of magnitude) measurement or approximation of the amounts or percentages of one or more components of a sample.

Sensitivity: the ability of a method or instrument to discriminating between minimally different levels of a variable of interest by producing a noticeably different measurement response.

Shall: denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there be no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specification so long as the requirement is fulfilled. (*Style Manual for Preparation of Proposed American National Standards*, American National Standards Institute, Eighth Edition (March 1991)).

Should: denotes a guideline or recommendation whenever noncompliance with the specification is permissible. (*Style Manual for Preparation of Proposed American National Standards*, American National Standards Institute, Eighth Edition (March 1991)).

Significance level: the magnitude of the acceptable probability of rejecting a true null hypothesis or of accepting a false null hypothesis; the difference between the hypothetical value and the sample result.

Significant digit: any of the digits 0 through 9, excepting leading zeros and some trailing zeros, which is used with its place value to denote a numerical quantity to a desired rounded number. See Rounded number.

Significant figure: see Significant digit.

Single operator precision: the degree of variation among the individual measurements of a series of determinations by the same analyst or operator, all other conditions being equal.

Site: the area within boundaries established for a defined activity.

Span check: a standard used to establish that a measurement method is not deviating from its calibrated range.

Span-drift: the change in the output of a continuous monitoring instrument over a stated time period during which the instrument is not recalibrated.

Span-gas: a gas of known concentration which is used routinely to calibrate the output level of an analyzer. See Calibration check standard.

Specification: document stating requirements. (ISO 8402)

Specimen: see Sample.

Spike: a known mass of target analyte added to a blank sample or subsample; used to determine recovery efficiency or for other quality control purposes.

Spiked laboratory blank: see Spiked reagent blank.

Spiked reagent blank: a specified amount of reagent blank fortified with a known mass of the target analyte; usually used to determine the recovery efficiency of the method.

Spiked sample: a sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Spiked samples are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Spiked sample duplicate analysis: see Duplicate analysis and Spiked sample.

Split samples: two or more representative portions taken from a sample or subsample and analyzed by different analysts or laboratories. Split samples are used to replicate the measurement of the variable(s) of interest.

Standard (measurement): a substance or material with a property quantified with sufficient accuracy to permit its use to evaluate the same property in a similar substance or material. Standards are generally prepared by placing a reference material in a matrix. See Reference material.

Standard addition: the procedure of adding known increments of the analyte of interest to a sample to cause increases in detection response. The level of the analyte of interest present in the original sample is subsequently established by extrapolation of the plotted responses.

Standard curve: see Calibration curve.

Standard deviation: the most common measure of the dispersion or imprecision of observed values expressed as the positive square root of the variance. See Variance.

Standard material: see Standard (measurement), Reference material.

Standard method: an assemblage of techniques and procedures based on consensus or other criteria, often evaluated for its reliability by collaborative testing and receiving organizational approval.

Standard operating procedure (SOP): a written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive tasks.

Standard reference material (SRM): a certified reference material produced by the U.S. National Institute of Standards and Technology and characterized for absolute content independent of analytical method.

Standard reference sample: see Secondary standard.

Standard solution: a solution containing a known concentration of analytes, prepared and verified by a prescribed method or procedure and used routinely in an analytical method.

Standardization: the process of establishing the quantitative relationship between a known mass of target material (e.g., concentration) and the response variable (e.g., the measurement system or instrument response.) See Calibration, Calibration curve and Multipoint calibration.

Statistic: an estimate of a population characteristic calculated from a data set (observed or corrected values), e.g., the mean or standard deviation.

Stratification: the division of a target population into subsets or strata which are internally more homogeneous with respect to the characteristic to be studied than the population as a whole.

Stratified sampling: the sampling of a population that has been stratified, part of the sample coming from each stratum. See Stratification.

Stock solution: a concentrated solution of analyte(s) or reagent(s) prepared and verified by prescribed procedure(s), and used for preparing working standards or standard solutions.

Subsample: a representative portion of a sample. A subsample may be taken from any laboratory or a field sample. See Aliquant, Aliquot, Split sample and Test portion.

Supplier: organization that provides a product to the customer. (ISO 8402)

Surrogate analyte: a pure substance with properties that mimic the analyte of interest. It is unlikely to be found in environmental samples and is added to them for quality control purposes.

Surveillance: the act of maintaining supervision of or vigilance over a well-specified portion of the environment so that detailed information is provided concerning the state of that portion.

Synthetic sample: a manufactured sample. See Quality control sample.

Systematic error: a consistent deviation in the results of sampling and/or analytical processes from the expected or known value. Such error is caused by human and methodological bias.

Systems audit: see Technical systems audit.

Systems error: see Total systems error.

Target: the chosen object of investigation for which qualitative and/or quantitative data or information is desired, e.g., the analyte of interest.

Technical systems audit: a thorough, systematic on-site, qualitative review of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a total measurement system.

Technique: a principle and/or the procedure of its application for performing an operation.

Test: a procedure used to identify or characterize a substance or constituent. See Method.

Test data: see Data.

Test determination: see Determination.

Test method: see Method.

Test portion: a subsample of the proper amount for analysis and measurement of the property of interest. A test portion may be taken from the bulk sample directly, but often preliminary operations, such as mixing or further reduction in particle size, are necessary. See Subsample.

Test result: a product obtained from performing a test determination. See Test determination.

Test sample: see Test portion.

Test specimen: see Test portion.

Test unit: see Test portion.

Time-proportioned sample: a composite sample produced by combining samples of a specific size, collected at preselected, uniform time intervals.

Tolerance Chart: A chart in which the plotted quality control data is assessed via a tolerance level (e.g. +/- 10% of a mean) based on the precision level judged acceptable to meet overall quality/data use requirements instead of a statistical acceptance criteria (e.g. +/- 3 sigma). (ANSI N42.23-1995, Measurement and Associated Instrument Quality Assurance for Radioassay Laboratories)

Total Quality Management (TQM): the process whereby an entire organization, led by senior management, commits to focusing on quality as a first priority in every activity. TQM implementation creates a culture in which everyone in the organization shares the responsibility for continuously improving the quality of products and services, (i.e., for "doing the right thing, the right way, the first time, on time.") in order to satisfy the customer.

- management approach of an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society. (ISO 8402)

Total measurement error: the sum of all the errors that occur from the taking of the sample through the reporting of results; the difference between the reported result

and the true value of the population that was to have been sampled.

Traceability: an unbroken trail of accountability for verifying or validating the chain-of-custody of samples, data, the documentation of a procedure, or the values of a standard.

The ability to trace the history, application or location of an entity by means of recorded identifications. (ISO 8402)

The property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons. (VIM - 6.12)

Treatment (experimental): an experimental procedure whose effect is to be measured and compared with the effect of other treatments.

Trip blank: a clean sample of matrix that is carried to the sampling site and transported to the laboratory for analysis without having been exposed to sampling procedures.

Tuning: the process of adjusting a measurement device or instrument, prior to its use, to ensure that it works properly and meets established performance criteria.

Type I error, (alpha error): an (incorrect) decision resulting from the rejection of a true hypothesis. (A false positive decision.)

Type II error, (beta error): an (incorrect) decision resulting from acceptance of a false hypothesis. (A false negative decision.)

Uncertainty: a measure of the total variability associated with a process that includes the two major error components: systematic error (bias) and random error (imprecision).

Universe: see Population.

Upper control limit: see Control limit.

Upper warning limit: see Warning limit.

User check: an evaluation of a written procedure (e.g., chemical analysis method) for clarity and accuracy in which an independent laboratory analyzes a small number of spiked samples, following the procedure exactly.

Valid study: a study conducted in accordance with accepted scientific methodology,

the results of which satisfy predefined criteria.

Validated method: a method which has been determined to meet certain performance criteria for sampling and/or measurement operations.

Validation: the process of substantiating specified performance criteria.
- confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. (ISO 8402)

Value: the magnitude of a quantity. A single piece of factual information obtained by observation or measurement and used as a basis of calculation.

Variable: an entity subject to variation or change.

Variance: see Sample variance.

Verifiable: the ability to be proven or substantiated.

Verification: Confirmation by examination and provision of objective evidence that specified requirements have been fulfilled. In design and development, validation concerns the process of examining a result of a given activity to determine conformance to the stated requirements for that activity. (ANSI/ISO/ASQC A8402-1994)

Warning limit: a specified boundary on a control chart that indicates a process may be going out of statistical control and that certain precautions are required. For example; for a Shewhart chart the warning limits are placed at plus and minus two standard deviations of the mean (i.e., at the 95% confidence interval.)

Working standard: see Secondary standard.

Zero check: a standard, usually devoid of the analyte or variable of interest, used to establish whether the ~zero~ point of a measurement method is still properly calibrated.

Zero drift: the change in instrument output over a stated time period of nonrecalibrated, continuous operation, when the initial input concentration is zero; usually expressed as a percentage of the full scale response.

Acronyms

AAPCO	American Association of Pest Control Officials (FIFRA)
ACS	American Chemical Society
ADQ	Audit of Data Quality
ANPRM	Advanced Notice of Proposed Rule Making
AOAC	Association of Official Analytical Chemists
AQCR	Air Quality Control Region
ARAR	Applicable or Relevant and Appropriate Standards, Limitations, Criteria, and Requirements
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BDAT	Best Demonstrated Available Technology
CA	Cooperative Agreement
CAA	Clean Air Act
CAIR	Comprehensive Assessment Information Rule
CAR	Corrective Action Report
CAS	Chemical Abstract Service
CBI	Compliance Biomonitoring Inspection
CEI	Compliance Evaluation Inspection
CEPP	Chemical Emergency Preparedness Program
CERCLA	Comprehensive Environmental Responsibility, Compensation and Liability Act
CFR	Code of Federal Regulations
CGI	Comprehensive Ground Water Inspection

CGME	Comprehensive Ground-Water Monitoring Evaluation
CIS	Compliance Inspection Strategy
CLP	Contract Laboratory Program
CME	Construction Management Evaluation
COE	U. S. Army Corps of Engineers
CRM	Certified Reference Material
CSI	Compliance Sampling Inspection
CSO	Combined Sewer Overflow
CV	Coefficient Variation
CWA	Clean Water Act
DL	Detection Limit
D&R	Demolition and Renovation
DMR-QA	Discharge Monitoring Report - QA Program
DPO	Deputy Project Officer
DQA	Data Quality Assessment
DQO	Data Quality Objectives
DU	Decision Unit
EDCA	Environmental Data Collection Activity
EDL	Estimated Detection Level
EHMW	Extra High Molecular Weight
EMAP	Environmental Monitoring Assessment Program
EMS	Enforcement Management System
EMPC	Estimated Maximum (Protocol) Concentration

ERAMS	Environmental Radiation Ambient Monitoring System
ERC	Emergency Response Contractor
ERCS	Emergency Response Cleanup Service
ERT	Emergency Response Team
ESAT	Environmental Service Assistant Team
ESP	Electrostatic Precipitator
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FISMP	Field Inspection with Sampling
FIT	Field Investigation Team
FR	Food Register
FRDS	Federal Reporting Data System
FS	Feasibility Study
GLP	Good Laboratory Practice
HDPE	High Density Polyethylene
HRS	Hazard Ranking System
HWDMS	Hazardous Waste Data Management System
I/A	Innovative/Alternative (Technology)
I&M	Inspection and Maintenance
ICP	Inductivity Coupled Atomic Emission Plasma Spectrometry
ICR	Information Collection Request
IFB	Invitation for Bidders
IMR	Immediate Removal

IMVS	Interlaboratory Method Validation Study
IRM	Initial Remedial Measure
ISS	Interim Status Survey
IU	Industrial User
LAER	Lowest Achievable Emissions Rate
LOEC	Lowest Observed Effect Concentration
LOIS	Loss of Interim Status
LOQ	Limit of Qualification
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goals
MCP	Municipal Compliance Plan
MDL	Method Detection Limit
MIT	Mechanical Integrity Test
MPRSA	Marine Protection, Research and Sanctuaries Act
MSR	Management Systems Review
MSIS	Model State Information System
MTR	Minimum Technology Requirements
NAAQS	National Ambient Air Quality Standards
NADB	National Aerometric Data Bank
NAMS	National Air Monitoring Stations
NBAR	Non-binding Preliminary Allocation of Responsibility
NCLAN	National Crop Loss Assessment Network
NCP	National Contingency Plan

NEDS	National Emissions Data Base
NEIC	National Enforcement Investigations Center (OECA, Denver)
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHANES	National Health and Nutrition Examination Study
NPDWR	National Primary Drinking Water Regulations
NOISH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Technology
NMP	National Municipal Policy
NOD	Notice of Deficiency
NOEC	No-Observed Effect Concentration
NOPEs	Non-Occupational Pesticide Exposure Study
NPAP	National Performance Audit Program
NPDES	National Pollutant Discharge Elimination System
NDHAP	National Pesticide Hazard Assessment Program
NPL	National Priority List
NPO	National Program Office
NPRM	Notice of Proposed Rule Making
NRC	National Resource Center
NSPS	New Source Performance Standards
NSR	New Source Review
NTIS	National Technical Information Service
O&M	Operation and Management
OSHA	Occupational Safety and Health Administration

PA/SI	Preliminary Assessment/Site Inspection
PA	Preliminary Assessment
PARS	Precision and Accuracy Reporting System
PCI	Pretreatment Compliance Inspection
PCS	Permit Compliance System
PE	Performance Evaluation
PE	Program Element
PI	Principal Investigator
PMC	Project Management Conference
PO	Project Officer
POTW	Publicly-Owned Treatment Works
PQL	Practical Quantitation Limits
PRP	Potential Responsible Party
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
PTI	Permit to Install
PWSSP	Public Water System Supervision Program
QA	Quality Assurance
QAMS	Quality Assurance Management Staff
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QC	Quality Control
QNCR	Quarterly Non-Compliance Report

RA	Remedial Action
RACM	Reasonably Available Control Measures
RACT	Reasonably Available Control Technologies
RAS	Routine Analytical Service (CLP)
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RE	Relative Error
REM	RI/FS Contractors
RFA	RCRA Facility Assessment (RCRA site version of PA/SI)
RFD	Reference Doses
RFP	Request for Proposals
RFP	Reasonable Further Progress (toward attainment)
RI	Reconnaissance Inspection
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RMCL	Recommended Maximum Contaminant Level
ROD	Record of Decision
RPM	Remedial Project Manager
RSCC	Regional Sample Control Center (CLP)
RSD	Risk Specified Doses
SAP	Sample Analysis Plan
SARA	Superfund Amendments and Reauthorizations Act of 1986
SAROAD	Storage and Retrieval of Aeromatic Data

SAS	Special Analytical Service (CLP)
SBO	Senior Budget Official
SCAP	Superfund Comprehensive Accomplishment Plan
SDWA	Safe Drinking Water Act
SI	Site Inspection
SIF	Site Inspection Follow-up
SIP	State Implementation Plan
SLAM	State Local Air Monitoring Stations
SNC	Significant Non-Compliance
SNUR	Significant New Use Rule (TSCA 5(e))
SOP	Standard Operating Procedure
SRM	Standard Reference Material
SS	Site Survey
SSID	Site/Spill Identification Designation
STC	Special Terms and Conditions
TAT	Technical Assistant Team
TCLP	Toxicity Characteristic Leaching Procedure
TCM	Traffic Control Measures
TDD	Technical Direction Document
TEAM	Total Exposure Assessment Methodology
TEGD	Technical Enforcement Guidance Document
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon

TOX	Total Organic Halides
TQM	Total Quality Management
TSA	Technical System Audit
TSCA	Toxic Substances Control Act
TSD	Temporary Storage and Disposal
TSDF	Temporary Storage and Disposal Facility
TSP	Total Suspended Particulates
TTO	Total Toxic Organics (NPDES permits)
UIC	Underground Injection Control
UST	Underground Storage Tanks
VE	Value Engineering
VE	Visual Emissions
VOA	Volatile Organics Analysis
VOC	Volatile Organic Contaminants
VOC	Volatile Organic Chemicals
WAM	Work Assignment Manager
WAP	Waste Analysis Plan
WENDB	Water Enforcement National Data Base
WLA	Waste Load Allocation
WQM	Waste Quality Management