

Glossary

Quality Assurance Terminology

Acceptance Criteria - Specified limits placed on characteristics of an item, process, or service defined in requirements documents. (ASQC Definitions)

Accuracy - A measure of the closeness of an individual measurement or the average of a number of measurements to the true value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations; the EPA recommends using the terms “*precision*” and “*bias*”, rather than “accuracy,” to convey the information usually associated with accuracy.

Activity - An all-inclusive term describing a specific set of operations of related tasks to be performed, either serially or in parallel (e.g., research and development, field sampling, analytical operations, equipment fabrication), that, in total, result in a product or service.

Analyte - A specific chemical that can be detected by a given analytical method.

Assessment - The evaluation process used to measure the performance or effectiveness of a system and its elements. As used here, assessment is an all-inclusive term used to denote any of the following: audit, performance evaluation (PE), management systems review (MSR), peer review, inspection, or surveillance.

Audit (quality) - A 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.

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.

Authenticate - The act of establishing an item as genuine, valid, or authoritative.

Background Sample - A sample taken from an area close to the site of investigation where chemicals present in the ambient media are assumed to be present at concentrations not associated with the investigation site.

Bias - The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample’s true value).

Blank - A sample subjected to the usual analytical or measurement process to establish a zero baseline or background value. Sometimes used to adjust or correct routine analytical results. A sample that is intended to contain none of the analytes of interest. A blank is used to detect contamination during sample handling preparation and/or analysis. There are many types of blanks, each with a specific purpose including:

Equipment Blanks - Monitor for potential contamination from decontamination procedures of field gear or from other sources of equipment contamination like oil or other lubricants.

Field Blank - A blank used to provide information about contaminants that may be introduced during sample collection, storage, and transport. A clean sample, carried to the sampling

site, exposed to sampling conditions, returned to the laboratory, and treated as an environmental sample.

Laboratory Blanks - Samples that are used to identify potential sources of contamination that are generated during the processing and analysis of samples in the laboratory.

Method Blank - A blank prepared to represent the sample matrix as closely as possible and analyzed exactly like the calibration standards, samples, and quality control (QC) samples. Results of method blanks provide an estimate of the within-batch variability of the blank response and an indication of bias introduced by the analytical procedure.

Trip Blank - A clean sample of a matrix that is taken to the sampling site and transported to the laboratory for analysis without having been exposed to sampling procedures.

Calibration - A comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments.

Calibration Curves - Curves that are generated by regression of the response of a detector against the known concentrations of analytes of interest. There are several types of calibration curves including:

Continuing Calibration - A mid-range concentration standard that is analyzed on a daily basis and is compared with the continuing calibration of fidelity to the regression relationship established using the continuing calibration. The continuing calibration is often referred to as the Daily Calibration.

Initial Calibration - A multi-concentration, generally multi-analyte series of known concentrations analyzed periodically to establish a regression relationship that established the lower and upper concentration limits.

Calibration Drift - The deviation in instrument response from a reference value over a period of time before recalibration.

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.

Chain of Custody - An unbroken trail of accountability that ensures the physical security of samples, data, and records.

Characteristic - Any property or attribute of a datum, item, process, or service that is distinct, describable, and/or measurable.

Check Standard - A standard prepared independently of the calibration standards and analyzed exactly like the samples. Check standard results are used to estimate analytical precision and to indicate the presence of bias due to the calibration of the analytical system.

Chromatograph - An analytical instrument that records the results of the chromatographic process.

Chromatography - Literally the process of separation by color, but is used most often to describe the process of separation of a complex mixture into individual components using the principles of differential sorption (i.e., adsorption and desorption from a chromatographic column).

Collocated Samples - Two or more portions collected at the same point in time and space so as to be considered identical. These samples are also known as field replicates and should be identified as such.

Comparability - A measure of the confidence with which one data set or method can be compared to another.

Completeness - A measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions.

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.

Confidentiality Procedure - A procedure used to protect confidential business information (including proprietary data and personnel records) from unauthorized access.

Configuration - The functional, physical, and procedural characteristics of an item, experiment, or document.

Conformance - An affirmative indication or judgment that a product or service has met the requirements of the relevant specification, contract, or regulation; also, the state of meeting the requirements.

Consensus Standard - A standard established by a group representing a cross section of a particular industry or trade, or a part thereof.

Continuing Calibration - A mid-range concentration standard that is analyzed on a daily basis and is compared with the continuing calibration of fidelity to the regression relationship established using the continuing calibration. The continuing calibration is often referred to as the Daily Calibration.

Contractor - Any organization or individual contracting to furnish services or items or to perform work.

Corrective Action - Any measures taken to rectify conditions adverse to quality and, where possible, to preclude their recurrence.

Daily Calibration - (see calibration curves, continuing calibration)

Data Quality Assessment (DQA) - The scientific and statistical evaluation of data to determine if data obtained from environmental operations are of the right type, quality, and quantity to support their intended use. The five steps of the DQA Process include: 1) reviewing the DQOs and sampling design, 2) conducting a preliminary data review, 3) selecting the statistical test, 4) verifying the assumptions of the statistical test, and 5) drawing conclusions from the data.

Data Quality Indicators (DQIs) - The 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 (bias is preferred), comparability, completeness, representativeness.

Data Quality Objectives (DQOs) - The qualitative and quantitative statements derived from the DQO Process that clarify study's technical and quality objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

Data Quality Objectives (DQO) Process - A systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use. DQOs are the qualitative and quantitative outputs from the DQO Process.

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

Data Usability - The process of ensuring or determining whether the quality of the data produced meets the intended use of the data.

Data Validation - A well-defined procedure for assessing whether or not a set of environmental data have met acceptability criteria defined in the data quality objective process. This procedure may follow existing guidelines, for example those defined by EPA (Guidelines for data validation; EPA New England data validation guidelines) or they can be defined by the user as part of the DQO process. These user-defined criteria may be either more or less strict than the EPA guidelines.

Deficiency - An unauthorized deviation from acceptable procedures or practices, or a defect in an item.

Demonstrated Capability - The capability to meet a procurement's technical and quality specifications through evidence presented by the supplier to substantiate its claims and in a manner defined by the customer.

Design - The specifications, drawings, design criteria, and performance requirements. Also, the result of deliberate planning, analysis, mathematical manipulations, and design processes.

Design Change - Any revision or alteration of the technical requirements defined by approved and issued design output documents and approved and issued changes thereto.

Design Review - A documented evaluation by a team, including personnel such as the responsible designers, the client for whom the work or product is being designed, and a quality assurance (QA)

representative but excluding the original designers, to determine if a proposed design will meet the established design criteria and perform as expected when implemented.

Detection Limit (DL) - A measure of the capability of an analytical method to distinguish samples that do not contain a specific analyte from samples that contain low concentrations of the analyte; 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 of probability. DLs are analyte- and matrix-specific and may be laboratory-dependent. Some of the more commonly used definitions are described below.

Instrument Detection Limit (IDL) - The lowest concentration or mass an instrument can detect above background instrument noise under ideal conditions. Sample preparation is not considered in the determination of an IDL.

Method Detection Limit - A statistically derived estimate of the lowest concentration or mass detectable under method conditions at the concentration evaluated. A series of standards at an estimated limit of detection is analyzed multiple times (usually 7), a standard deviation of these seven replicate analyses is determined and the standard deviation is multiplied by the Student's t-distribution statistic at 6 degrees of freedom (3.14). See Reporting Limit.

Practical Quantitation Limit (PQL) - A measure of the lowest limit of detection under the conditions of a particular method. The PQL is often determined by multiplying the MDL by a factor of between 3 and 10.

Reporting Limit (RL) - For a target analyte, the reporting limit is instrument dependent and based on the lowest point on the calibration curve.

Distribution - 1) The appointment of an environmental contaminant at a point over time, over an area, or within a volume; 2) a probability function (density function, mass function, or distribution function) used to describe a set of observations (statistical sample) or a population from which the observations are generated.

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.

Duplicate Analysis - A measure of precision determined by analyzing samples twice or by analyzing a second sample taken from the same source at the same time and analyzed under identical conditions. There are several different types of duplicate samples that provide information on the precision of specific types of environmental data operations

Field Duplicates - Independent samples that are collected as close as possible to the same point in time and space. They are two separate samples taken from the same source, stored in separate containers and analyzed independently. These types of

duplicates are useful in characterizing the precision of the sampling process.

Matrix Duplicates - An intralaboratory split sample that is used to document the precision of a method in a given sample matrix.

Split Samples - Two or more representative portions taken from one sample in the field or in the laboratory and analyzed by different analysts or laboratories. Split samples are quality control (QC) samples that are used to assess analytical variability and comparability.

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 also collocated sample.

Environmental Conditions - The description of a physical medium (e.g., air, water, soil, sediment) or a biological system expressed in terms of its physical, chemical, radiological, or biological characteristics.

Environmental Data - Any parameters or pieces of information collected or produced from measurements, analyses, or models of environmental processes, conditions, and effects of pollutants on human health and the ecology, including results from laboratory analyses or from experimental systems representing such processes and conditions.

Environmental Data Operations - Any work performed to obtain, use, or report information pertaining to environmental processes and conditions.

Environmental Monitoring - The process of measuring or collecting environmental data.

Environmental Processes - Any manufactured or natural processes that produce discharges to, or that impact, the ambient environment.

Environmental Programs - An all-inclusive term pertaining to any work or activities involving the environment, including but not limited to: characterization of environmental processes and conditions; environmental monitoring; environmental research and development; the design, construction, and operation of environmental technologies; and laboratory operations on environmental samples.

Environmental Technology - An all-inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be utilized to remove pollutants or contaminants from, or to prevent them from entering, the environment. Examples include wet scrubbers (air), soil washing (soil), granulated activated carbon unit (water), and filtration (air, water). Usually, this term applies to hardware-based systems; however, it can also apply to methods or techniques used for pollution prevention, pollutant reduction, or containment of contamination to prevent further movement of the contaminants, such as capping, solidification or vitrification, and biological treatment.

Equipment Blanks - Monitor for potential contamination from decontamination procedures of field gear or from other sources of equipment contamination like oil or other lubricants.

Estimate - A characteristic from the sample from which inferences on parameters can be made.

Evidentiary Records - Any records identified as part of litigation and subject to restricted access, custody, use, and disposal.

Expedited Change - An abbreviated method of revising a document at the work location where the document is used when the normal change process would cause unnecessary or intolerable delay in the work.

Environmental Technology - An all-inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be utilized to remove pollutants or contaminants from or prevent them from entering the environment. Examples include wet scrubbers (air), soil washing (soil), granulated activated carbon unit (water), and filtration (air, water). Usually, this term will apply to hardware-based systems; however, it will also apply to methods or techniques used for pollution prevention, pollution reduction, or containment of contamination to prevent further movement of the contaminants, such as capping, solidification or vitrification, and biological treatment.

Extraction - The process of releasing compounds for a sample matrix prior to analysis.

Field Analysis - Analyses that are performed external to a fixed laboratory. Field analysis can be qualitative or quantitative depending on the instruments used to perform the analyses and the level of instrument calibration.

Field Blank - A blank used to provide information about contaminants that may be introduced during sample collection, storage, and transport. A clean sample, carried to the sampling site, exposed to sampling conditions, returned to the laboratory, and treated as an environmental sample.

Field Duplicates - Independent samples that are collected as close as possible to the same point in time and space. They are two separate samples taken from the same source, stored in separate containers and analyzed independently. These types of duplicates are useful in characterizing the precision of the sampling process.

Field Screening - Analysis in the field using portable instrumentation that may include hand-held devices with general detectors (e.g., photoionization detectors (PID) or portable gas chromatographs equipped with an appropriate detector (flame ionization detector, mass spectrometer, etc.).

Field Blank - A blank used to provide information about contaminants that may be introduced during sample collection, storage, and transport. A clean sample, carried to the sampling site, exposed to sampling conditions, returned to the laboratory, and treated as an environmental sample.

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

Field Split Samples - Two or more representative portions taken from the same sample and submitted for analysis to different laboratories to estimate interlaboratory precision.

Financial Assistance - The process by which funds are provided by one organization (usually governmental) to another organization for the purpose of performing work or furnishing services or items. Financial assistance mechanisms include grants, cooperative agreements, and governmental interagency agreements.

Finding - An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative, and is normally accompanied by specific examples of the observed condition.

Flame Ionization Detector (FID) - A universal detector that uses a flame to burn a gas stream usually from a chromatographic column.

Goodness-of-Fit Test - 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.

Grade - The category or rank given to entities having the same functional use but different requirements for quality.

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 also Data Quality Objectives (DQO) Process.

Guidance - A suggested practice that is not mandatory, intended as an aid or example in complying with a standard or requirement.

Guideline - A suggested practice that is not mandatory in programs intended to comply with a standard.

Hazardous Waste - Any waste material that satisfies the definition of hazardous waste given in 40 CFR 261, "Identification and Listing of Hazardous Waste."

Holding Time - The period of time 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 any data not meeting all of the specified acceptance criteria.

Identification Error - The misidentification of an analyte. In this error type, the contaminant of concern is unidentified and the measured concentration is incorrectly assigned to another contaminant.

Independent Assessment - An assessment performed by a qualified individual, group, or organization that is not a part of the organization directly performing and accountable for the work being assessed.

Initial Calibration - A multi-concentration, generally multi-analyte series of known concentrations analyzed periodically to establish a regression relationship that established the lower and upper concentration limits.

Inspection - The examination or measurement of an item or activity to verify conformance to specific requirements.

Instrument Detection Limit (IDL) - The lowest concentration or mass an instrument can detect above background instrument noise under ideal conditions. Sample preparation is not considered in the determination of an IDL.

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

Laboratory Blanks - Samples that are used to identify potential sources of contamination that are generated during the processing and analysis of samples in the laboratory.

Laboratory 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 the data comparability.

Limit of Quantitation - The minimum concentration of an analyte or category of analytes in a specific matrix that can be identified and quantified above the method detection limit and within specified limits of precision and bias during routine analytical operating conditions.

Management - Those individuals directly responsible and accountable for planning, implementing, and assessing work.

Management System - A structured, nontechnical system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for conducting work and producing items and services.

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

Mass Spectrometer - An instrument detector that is used to generate mass spectra. Most often in routine environmental analysis a quadrupole mass analyzer is used to generate mass spectra, however other types of mass spectrometers can be used (e.g., magnetic sector instruments).

Mass Spectrometry - The science of using the principles of thermodynamics generate and interpret mass to charge ratios called mass spectra.

Mass Spectra - The plural of mass spectrum.

Mass Spectrum - The result of mass spectrometry. A mass spectrum is a characteristic pattern of mass to charge fragments generated from the bombardment of individual compounds in the gas phase. Mass spectra of unknown compounds can be compared to the spectra from standard mass spectral libraries.

Matrix - The component or substrate (e.g., surface water, drinking water, soil, sediment, tissue) that contains that analyte of interest.

Matrix Duplicates - An intralaboratory split sample that is used to document the precision of a method in a given sample matrix.

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

Mean (arithmetic) - The sum of all the values of a set of measurements divided by the number of values in the set; a measure of central tendency.

Mean Squared Error - A statistical term for variance added to the square of the bias.

Measurement and Testing Equipment (M&TE) - Tools, gauges, instruments, sampling devices, or systems used to calibrate, measure, test, or inspect in order to control or acquire data to verify conformance to specified requirements.

Memory Effects Error - The effect that a relatively high concentration sample has on the measurement of a lower concentration sample of the same analyte when the higher concentration sample precedes the lower concentration sample in the same analytical instrument.

Method - A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed.

Method Blank - A blank prepared to represent the sample matrix as closely as possible and analyzed exactly like the calibration standards, samples, and quality control (QC) samples. Results of method blanks provide an estimate of the within-batch variability of the blank response and an indication of bias introduced by the analytical procedure.

Method Detection Limit - A statistically derived estimate of the lowest concentration or mass detectable under method conditions at the concentration evaluated. A series of standards at an estimated limit of detection is analyzed multiple times (usually 7), a standard deviation of these seven replicate analyses is determined and the standard deviation is multiplied by the Student's t-distribution statistic at 6 degrees of freedom (3.14). See Reporting Limit.

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

Mixed Waste - A hazardous waste material as defined by 40 CFR 261 Resource Conservation and Recovery Act (RCRA) and mixed with radioactive waste subject to the requirements of the Atomic Energy Act.

Must - When used in a sentence, a term denoting a requirement that has to be met.

Nonconformance - A deficiency in a characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate; nonfulfillment of a specified requirement.

Objective Evidence - Any documented statement of fact, other information, or record, either quantitative or qualitative, pertaining to the quality of an item or activity, based on observations, measurements, or tests that can be verified.

Observation - An assessment conclusion that identifies a condition (either positive or negative) that does not represent a significant impact on an item or activity. An observation may identify a condition that has not yet caused a degradation of quality.

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

Organization Structure - The responsibilities, authorities, and relationships, arranged in a pattern, through which an organization performs its functions.

Outlier - An extreme observation that is shown to have a low probability of belonging to a specified data population.

Parameter - A quantity, usually unknown, such as a mean or a standard deviation characterizing a population. Commonly misused for "variable," "characteristic," or "property."

Peer Review - A documented critical review of work generally beyond the state of the art or characterized by the existence of potential uncertainty. Conducted by qualified individuals (or an organization) who are independent of those who performed the work but collectively equivalent in technical expertise (i.e., peers) to those who performed the original work. Peer reviews are conducted to ensure that activities are technically adequate, competently performed, properly documented, and satisfy established technical and quality requirements. An in-depth assessment of the assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria, and conclusions pertaining to specific work and of the documentation that supports them. Peer reviews provide an evaluation of a subject where quantitative methods of analysis or measures of success are unavailable or undefined, such as in research and development.

Percent Recovery - Used as a measure of accuracy.

Performance Evaluation (PE) - 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 (PE) Sample - A sample of known composition provided to a laboratory to determine laboratory compliance with a predetermined set of quality assurance and quality control criteria.

Pollution Prevention - An organized, comprehensive effort to systematically reduce or eliminate pollutants or contaminants prior to their generation or their release or discharge into the environment.

Practical Quantitation Limit (PQL) - A measure of the lowest limit of detection under the conditions of a particular method. The PQL is often determined by multiplying the MDL by a factor of between 3 and 10.

Precision - A measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions expressed generally in terms of the standard deviation.

Procedure - A specified way to perform an activity.

Process - A set of interrelated resources and activities that transforms inputs into outputs. Examples of processes include analysis, design, data collection, operation, fabrication, and calculation.

Project - An organized set of activities within a program.

Qualified Data - Any data that have been modified or adjusted as part of statistical or mathematical evaluation, data validation, or data verification operations.

Qualified Services - An indication that suppliers providing services have been evaluated and determined to meet the technical and quality requirements of the client as provided by approved procurement documents and demonstrated by the supplier to the client's satisfaction.

Quality - The totality of features and characteristics of a product or service that bears on its ability to meet the stated or implied needs and expectations of the user.

Quality Assurance (QA) - An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client.

Quality Assurance Program Description/Plan – (see Quality Management Plan)

Quality Assurance Project Plan (QAPP) - A formal document describing in comprehensive detail the necessary quality assurance (QA), quality control (QC), and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. The QAPP components are divided into four classes: 1) Project Management, 2) Measurement/Data Acquisition, 3) Assessment/Oversight, and 4) Data Validation and Usability. Requirements for preparing QAPPs can be found in EPA QA/R-5.

Quality Control (QC) - The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality. The system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring the results are of acceptable quality.

Quality Control (QC) Sample - An uncontaminated sample matrix spiked with known amounts of analytes from a source independent of the calibration standards. 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.

Quality Improvement - A management program for improving the quality of operations. Such management programs generally entail a formal mechanism for encouraging worker recommendations with timely management evaluation and feedback or implementation.

Quality Management - That aspect of the overall management system of the organization that determines and implements the quality policy. Quality management includes strategic planning, allocation of resources, and other systematic activities (e.g., planning, implementation, and assessment) pertaining to the quality system.

Quality Management Plan (QMP) - A formal document that describes the quality system in terms of the organization's structure, the functional responsibilities of management and staff, the lines of authority, and the required interfaces for those planning, implementing, and assessing all activities conducted.

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 quality assurance (QA) and quality control (QC).

Radioactive Waste - Waste material containing, or contaminated by, radionuclides, subject to the requirements of the Atomic Energy Act.

Readiness Review - A systematic, documented review of the readiness for the 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.

Record (quality) - A document that furnishes objective evidence of the quality of items or activities and that has been verified and authenticated as technically complete and correct. Records may include photographs, drawings, magnetic tape, and other data recording media.

Recovery - The act of determining whether or not the methodology measures all of the analyte contained in a sample.

Relative Standard Deviation (RSD) - a measure of precision calculated by: $RSD = S/x \times 100$.

Remediation - The process of reducing the concentration of a contaminant (or contaminants) in air, water, or soil media to a level that poses an acceptable risk to human health.

Repeatability - The degree of agreement between 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 time period.

Reporting Limit (RL) - For a target analyte, the reporting limit is instrument dependent and based on the lowest point on the calibration curve.

Representativeness - A measure of the degree to which data accurately and precisely represent a characteristic of a population, a parameter variation at a sampling point, a process condition, or an environmental condition.

Reproducibility - The precision, usually expressed as variance, that measures the variability among the results of measurements of the same sample at different laboratories.

Requirement - A formal statement of a need and the expected manner in which it is to be met.

Research (applied) - A process, the objective of which is to gain the knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Research (basic) - A process, the objective of which is to gain fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Research Development/Demonstration - The systematic use of the knowledge and understanding gained from research and directed toward the production of useful materials, devices, systems, or methods, including prototypes and processes.

Round-Robin Study - A method validation study involving a predetermined 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.

Ruggedness Study - 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 variations affect test results. If a variation affects the results significantly, the method restrictions are tightened to minimize this variability.

Sampling and Analysis Plan - A document consisting of a description of the quality assurance, field sampling steps and laboratory analysis for a given environmental data gathering effort.

Scientific Method - The principles and processes regarded as necessary for scientific investigation, including rules for concept or hypothesis formulation, conduct of experiments, and validation of hypotheses by analysis of observations.

Self-Assessment - The assessments of work conducted by individuals, groups, or organizations directly responsible for overseeing and/or performing the work.

Sensitivity - The capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest.

Service - The result generated by activities at the interface between the supplier and the customer, and the supplier internal activities to meet customer needs. Such activities in environmental programs include design, inspection, laboratory and/or field analysis, repair, and installation.

Shall - A term denoting a requirement that is mandatory whenever the criterion for conformance with the specification permits no deviation. This term does not prohibit the use of alternative approaches or methods for implementing the specification so long as the requirement is fulfilled.

Significant Condition - Any state, status, incident, or situation of an environmental process or condition, or environmental technology in which the work being performed will be adversely affected sufficiently to require corrective action to satisfy quality objectives or specifications and safety requirements.

Software Life Cycle - The period of time that starts when a software product is conceived and ends when the software product is no longer available for routine use. The software life cycle typically includes a requirement phase, a design phase, an implementation phase, a test phase, an installation and check-out phase, an operation and maintenance phase, and sometimes a retirement phase.

Source Reduction - Any practice that reduces the quantity of hazardous substances, contaminants, or pollutants.

Span Check - A standard used to establish that a measurement method is not deviating from its calibrated range.

Speciation - The ability of a chemical to exist in several forms (e.g., valence state, complexation). Speciation is generally controlled by redox conditions and pH.

Specification - A document stating requirements and referring to or including drawings or other relevant documents. Specifications should indicate the means and criteria for determining conformance.

Spike - A substance that is added to an environmental sample to increase the concentration of target analytes by known amounts; used to assess measurement accuracy (spike recovery). Spike duplicates are used to assess measurement precision.

Split Samples - Two or more representative portions taken from one sample in the field or in the laboratory and analyzed by different analysts or laboratories. Split samples are quality control (QC) samples that are used to assess analytical variability and comparability.

Standard Deviation - A measure of the dispersion or imprecision of a sample or population distribution expressed as the positive square root of the variance and has the same unit of measurement as the mean.

Standard Operating Procedure (SOP) - A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps and that is officially approved as the method for performing certain routine or repetitive tasks.

Standard Reference Material - A quality control tool that is a matrix-specific, single or multi-component mixture of analytes that has been certified by an entity external to the laboratory performing the analysis for a particular concentration. This quality control element is used to monitor accuracy.

Supplier - Any individual or organization furnishing items or services or performing work according to a procurement document or a financial assistance agreement. An all-inclusive term used in place of any of the following: vendor, seller, contractor, subcontractor, fabricator, or consultant.

Surrogate Spike or 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 to establish that the analytical method has been performed properly.

Surrogate Standard - A standard of known concentration added to environmental samples for quality control purposes. A surrogate standard is unlikely to be found in environmental samples but has similar properties. Surrogates are intended to monitor for recovery differences, problems during the extraction phase of the analysis and for any potential matrix interferences.

Surveillance (quality) - Continual or frequent monitoring and verification of the status of an entity and the analysis of records to ensure that specified requirements are being fulfilled.

Target Analyte - A compound associated with a particular analytical method.

Technical Review - A documented critical review of work that has been performed within the state of the art. The review is accomplished by one or more qualified reviewers who are independent of those who performed the work but are collectively equivalent in technical expertise to those who performed the original work. The review is an in-depth analysis and evaluation of documents, activities, material, data, or items that require technical verification or validation for applicability, correctness, adequacy, completeness, and assurance that established requirements have been satisfied.

Technical Systems Audit (TSA) - A thorough, systematic, on-site qualitative audit of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a system.

Tentatively Identified Compound (TIC) - Compounds that are detected in environmental samples that are not target analytes. TICs are identified generally as a result of using mass spectrometry techniques. When a TIC is identified, it can be definitively identified by analyzing an authentic standard of the putative unknown.

Total Petroleum Hydrocarbons (TPH) - TPH is an operationally defined parameter with no universally accepted definition, therefore it is incumbent upon the ultimate data user to establish a working definition of TPH on a project specific basis. Some useful definitions are presented here.

MCP Definition - The MCP defines TPH as all compounds containing carbon and hydrogen only from nC9 through nC36.

Traceability - The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project.

Trip Blank - A clean sample of a matrix that is taken to the sampling site and transported to the laboratory for analysis without having been exposed to sampling procedures.

Validation - Confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use have been fulfilled. In design and development, validation concerns the process of examining a product or result to determine conformance to user needs.

Variance (statistical) - A measure or dispersion of a sample or population distribution.

Verification - Confirmation by examination and provision of objective evidence that specified requirements have been fulfilled. In design and development, verification concerns the process of examining a result of a given activity to determine conformance to the stated requirements for that activity.