Glossary

Accuracy. The degree of agreement of a measured value with the true or expected value of the quantity of concern.

Analyte. The chemical for which a sample is analyzed.

Analyte Speciation. The ability of an analyte to exist in, or change between, chemically different forms (e.g., valence state, complexation state) depending on ambient conditions.

Anthropogenic Background Levels. Concentrations of chemicals that are present in the environment due to human-made, non-site sources (e.g., industry, automobiles).

Audit Sample. A sample of known composition provided by EPA for contractor analysis to evaluate contractor performance.

Average. The sum of a set of observations divided by the number of observations. Other measures of central tendency are median, mode, or geometric mean.

Background Sample. A sample taken from a location where chemicals present in the ambient medium are assumed due to natural sources.

Bias. A systematic error inherent in a method or caused by some artifact or idiosyncrasy of the measurement system.

Biased Sampling. A sampling plan in which the data obtained may be systematically different from the true mean. Biased sampling protocols are appropriate for certain objectives (e.g., clustering of samples to search for hot spots).

Biota. The plants and animals of the study area.

Blank. A clean sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage, or analysis.

Broad Spectrum Analysis. An analytical procedure capable of providing identification and quantitation of a wide variety of chemicals.

Calibration. The comparison of a measurement standard or instrument with another standard or instrument to report or eliminate, by adjustment, any variation (deviation) in accuracy of the item being compared. The levels of calibration standards should bracket the range of levels for which actual measurements are to be made.

Cancer Slope Factor. A plausible, upper-bound estimate of the probability of cancer response in an exposed individual, per unit intake over a lifetime exposure period.

Chain-of-Custody Records. Records that contain information about the sample from sample collection to final analysis. Such documentation includes labeling to prevent mix-up, container seals to detect unauthorized tampering with contents and to secure custody, and the necessary records to support potential litigation.

Chemical of Potential Concern. A chemical initially identified or suspected to be present at a site that may be hazardous to human health.

Classical Model. A statistical description of experimental data that assumes normality and independence.

Confidence. Statistically, a measure of the probability of taking action when action is required or that an observed value is correct. A confidence limit is a value above or below a measured parameter that is likely to be observed at a specified level of confidence.

Contract Laboratory Program (CLP). Analytical program developed for analysis of Superfund site samples to provide analytical results of known quality, supported by a high level of quality assurance and documentation.

Contract Required Quantitation Limit (CRQL). The chemical-specific quantitation levels that the CLP requires to be routinely and reliably quantitated in specified sample matrices.

Data Assessment. The determination of the quantity and quality of data and their useability for risk assessment.

Data Quality Indicator (DQI). A performance measure for sampling and analytical procedures.

Data Quality Objectives (DQOs). Qualitative and quantitative statements that specify the quality of the data required to support decisions. DQOs are determined based on the end use of the data to be collected.

Data Review. The evaluation process that determines the quality of reported analytical results. It involves examination of raw data (e.g., instrument output) and quality control and method parameters by a professional with knowledge of the tests performed.

Data Useability. The ability or appropriateness of data to meet their intended use.

Data Validation. CLP-specific evaluation process that examines adherence to performance-based acceptance criteria as outlined in *National Functional Guidelines for Organic (or Inorganic) Data Review* (EPA 1991e, EPA 1988e).

Detection Limit. The minimum concentration or weight of an analyte that can be detected by a single measurement above instrumental background noise.

Dilution. Adding solvent to a sample, with an analyte concentration higher than the standard calibration curve, to bring the analyte concentration into a quantifiably measurable range.

Dissolved Metals. Metals present in solution rather than sorbed on suspended particles.

Domain. A mappable subset of the total area containing the populations, after which distinct statistical properties can be described.

Dose-Response Evaluation. The process of quantitatively evaluating toxicity information and characterizing the relationship between the dose of a contaminant administered or received and the incidence of adverse health effects in the exposed populations.

Duplicate. A second sample taken from the same source at the same time and analyzed under identical conditions to assist in the evaluation of sample variance.

Exposure Area. The area of a site over which a receptor is likely to contact a chemical of potential concern.

Exposure Assessment. The determination or estimation (qualitative or quantitative) of the magnitude, frequency, duration, and route of exposure.

Exposure Pathway. The course of a chemical or physical agent from a source to a receptor. Each exposure pathway includes a release from a source, an exposure point, and an exposure route.

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

False Negative (type II or beta error). A statement that a condition **does not** exist when it actually **does**.

False Positive (type I or alpha error). A statement that a condition **does** exist when it actually **does not**.

Field Analyses. Analyses performed in the field using sophisticated portable instruments or instruments set up in a mobile laboratory on site. Results are available in real time or in several hours and may be quantitative or qualitative.

Field Portable. An instrument that is sufficiently rugged and not of excessive weight that can be carried and used by an individual in the field.

Field Screening. Analyses performed in the field using portable instruments. The results are available in real time but are often not compound-specific or quantitative.

Fixed Laboratory Analyses. Analyses performed in an off-site analytical laboratory.

Frequency of Occurrence. The ratio of occurrence of a chemical existing at a site compared to occurrence at all sites or compared to the frequency at which the chemical was tested for.

Geographical Information System (GIS). A computerized database designed to overlay multiple information elements such as maps, annotations, drawings, digital photos, and estimated concentrations.

Geostatistical Model. A statistical or mathematical description of experimental data with special attention to spatial covariance or temporal variation.

Geostatistics. A theory of statistics that recognizes observed concentrations as dependent on one another and governed by physical processes. Geostatistical methods consider the location of data and the size of the site for calculations.

Heterogeneous Distribution. Sample property that is unevenly distributed in the population.

Historical Data. Data collected before the remedial investigation.

Holding Time. The length of time from the date of sampling to the date of analysis. CLP designates the holding time as the date from laboratory receipt of sample until date of analysis.

Homogeneous Distribution. A sample property that is evenly distributed over the population.

Hot Spot. Location of a substantially higher concentration of a chemical of concern than in surrounding areas of a site.

Hydrocarbon. An organic compound composed of carbon and hydrogen.

Identification. Confirmation of the presence of a specific compound or analyte in a sample.

Instrument Detection Limit (IDL). The lowest amount of a substance that can be detected by an instrument without correction for the effects of sample matrix, handling and preparation.

Intake. A measure of exposure expressed as the mass of a substance in contact with the exchange boundary per unit body weight and unit time.

Integrated Risk Information System (IRIS). An EPA database containing verified RfDs, RfCs, slope factors, up-to-date health risks and EPA regulatory information for numerous chemicals. IRIS is EPA's preferred source for toxicity information for Superfund.

Internal Standard. A compound added to organic samples and blanks at a known concentration prior to analysis. It is used as the basis for quantitation of target compounds.

Judgmental/Purposive Sampling. The process of locating sampling points based on the investigator's best judgment from historical data of where the sample should be taken.

Kriging. A procedure utilizing a spatial covariance function and known values at sampling locations to estimate unknown values at unsampled locations. For each estimate, an error of estimate is generated.

Limit of Detection (LOD). The concentration of a chemical that has a 99% probability of producing an analytical result above background "noise" using a specific method.

Limit of Quantitation (LOQ). The concentration of a chemical that has a 99% probability of producing an analytical result above the LOD. Results below LOQ are not quantitative.

Linearity. The agreement between an actual instrument reading and the reading predicted by a straight line drawn between calibration points that bracket the reading.

Lowest-Observable-Adverse-Effect-Level (LOAEL). In dose experiments, the lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its apparent control group.

Mass Spectrum. A characteristic pattern of ion fragments of different masses resulting from analysis that can be compared with a mass spectral library for analyte identification.

Matrix/Medium. The predominant material comprising the sample to be analyzed (e.g., drinking water, sludge, air).

Measurement Error. The difference between the true sample value and the observed measured value.

Measurement Variability. The difference between an observed measurement and the unknown true value of the property being measured.

Media Variability. Variability attributed to matrix effects.

Method Blank Performance. A measure that defines the level of laboratory background and reagent contamination. It is determined by analyzing a method blank consisting of all reagents, internal standards, and surrogate standards that are carried through the entire analytical procedure.

Method Detection Limit (MDL). The detection limit that takes into account the reagents, sample matrix, and preparation steps applied to a sample in specific analytical methods.

Minimum Detectable Relative Difference. Percent difference between two concentration levels that can be detected in analyses.

Modeling. A mathematical description of an experimental data set.

Natural Variation. Variation in values or properties of a parameter that are primarily determined by natural forces or conditions (e.g., variation in background levels of a chemical of potential concern in soils at a site).

Normal Distribution. A probability density function that approximates the distribution of many random variables and has the form generally called the "bell-shaped curve."

Null Hypothesis. For risk assessment, statistical hypothesis that states on-site chemical concentrations are not higher than background.

Particulate. Solid material suspended in a fluid medium (air or water).

Performance Evaluation Sample. A sample of known composition provided for laboratory analysis to monitor laboratory and method performance.

Performance Objectives. Statements of the type and content of deliverables and results that are necessary to assess the useability of data for risk assessment. For example, documentation (chain-of-custody records) must be available to relate all sample results to geographic locations.

Population Variability. The variation in true pollution levels from one population unit to the next. Some factors that cause this variation are distance, direction, and elevation.

Power. A parameter used in statistics that measures the probability that the result from a specified sampling or analytical process correctly indicates that no further action is required.

Practical Quantitation Limit (PQL). The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Precision. A measure of the agreement among individual measurements of the same property, under prescribed similar conditions.

Preliminary Remediation Goals (PRGs). Initial clean-up goals that 1) are protective of human health and the environment and 2) comply with ARARs. They are developed early in the process based on readily available information and are modified to reflect results of the baseline risk assessment. They also are used during analysis of remedial alternatives in the remedial investigation/feasibility study (RI/FS)

Preservation. Treatment of a sample to maintain representative sample properties.

Qualifier. A code appended to an analytical result that indicates possible qualitative or quantitative uncertainty in the result.

Qualitative. An analysis that identifies an analyte in a sample without numerical certainty.

Quality Assurance Project Plan (QAPjP). An orderly assembly of detailed and specific procedures which delineates how data of known and accepted quality is produced for a specific project.

Quantitation Limit. The lowest experimentally measurable signal obtained for the actual analyte using a particular procedure.

Quantitative. An analysis that gives a numerical level of certainty to the concentration of an analyte in a sample.

Random Sampling. The process of locating sample points randomly within a sampling area.

Range of Linearity. The concentration range over which the analytical curve remains linear. The limit within which response is linearly related to concentration.

Reasonable Maximum Exposure (RME). The maximum exposure that could reasonably be expected to occur for a given exposure pathway at a site. The RME is intended to account for both variability in exposure parameters and uncertainty in the chemical concentration.

Receptor. An individual organism or species, or a segment of the population of the organism or species, that is exposed to a chemical.

Recovery. A determination of the accuracy of the analytical procedure made by comparing measured values for a spiked sample against the known spike values.

Reference Concentration (RfC). An estimate, with uncertainty spanning an order of magnitude, of continuous exposure to the human population (including sensitive subgroups) through inhalation that is likely to be without appreciable risk of deleterious effect during a lifetime.

Reference Dose (RfD). An estimate (with uncertainty spanning an order of magnitude or more) of a daily exposure level for a human population, including sensitive subpopulations, that is likely to be without an appreciable risk of adverse health effects over the period of exposure.

Relative Percent Difference (RPD). A measure of precision which is based on the mean of two values from related analyses and is reported as an absolute value.

Relative Response Factor (RRF). A measure of the relative mass spectral response of an analyte compared to its internal standard. RRFs are determined by the analysis of standards and are used in the calculation of concentration of analytes in samples.

Remedial Investigation (RI). A process for collecting data to characterize site and waste and for conducting treatability testing as necessary to evaluate the performance and cost of the treatment technologies and support the design of selected remedies.

Representativeness. The degree to which the data collected accurately reflect the actual concentration or distribution.

Retention Time. The length of time that a compound is retained on an analytical column (common in GC, HPLC, and IC).

Risk*Assistant A software developed for EPA which provides analytical tools and databases to assist exposure and risk assessments of chemically contaminated sites.

Risk Characterization. The process of integrating the results of the exposure and toxicity assessments (i.e., comparing estimates of intake with appropriate toxicological values to determine the likelihood of adverse effects in potentially exposed populations).

Routine Method. A method issued by an organization with appropriate responsibility. A routine method has been validated and published and contains information on minimum performance characteristics.

Sample Integrity. The maintenance of the sample in the same condition as when sampled.

Sample Quantitation Limit (SQL). The detection limit that accounts for sample characteristics, sample preparation and analytical adjustments, such as dilution.

Sampling and Analysis Plan (SAP). A document consisting of a quality assurance project plan, and the field sampling plan, which provides guidance for all field sampling and analytical activities that will be performed.

Sampling Variability. The variability attributed to various sampling schemes, such as judgmental sampling and systematic sampling.

Sensitivity. The capability of methodology or instrumentation to discriminate between measurement responses for quantitative differences in a parameter of interest.

Simple Random Sampling. A sampling scheme where positions, times, or intervals are based on a randomized selection.

Slope Factor. A plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime. The slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular level of a potential carcinogen.

Solvent. A liquid used to dissolve and separate analytes from the matrix of origin.

Spatial Variation. The manner in which contaminants vary within a defined area. The magnitude of difference in contaminant concentrations in samples separated by a known distance is a measure of spatial variability.

Spike. A known amount of a chemical added to a sample for the purpose of determining efficiency of recovery; a type of quality control sample.

Split. A single sample divided for the same measurement by two processes for the purpose of monitoring precision, accuracy or comparability of two analyses.

Standard Deviation. The most common measure of the dispersion of observed values or results expressed as the magnitude of the square root of the variance.

Standard Operating Procedures (SOPs). A written document which details an operation, analysis, or action whose mechanisms are thoroughly prescribed.

Stratified Random Sampling. A sampling scheme where the target population is divided into a certain number of non-overlapping parts for the purpose of achieving a better estimate of the population parameter.

Stratified Systematic Sampling. A sampling scheme where a consistent pattern is apportioned to various subareas or domains.

Stratify. To divide a physical volume or area into discrete units (strata) which are assumed to have different characteristics; a numeric procedure to subdivide a set or sets of data.

Surrogate Standard. A standard of known concentration added to environmental samples for quality control purposes. A surrogate standard is not likely to be found in an environmental sample, but has similar analytical properties to one or more analytes of interest.

Surrogate Technique. The use of surrogate analytes to assess the effectiveness of an analytical process (i.e., the ability to recover analytes from a complex environmental matrix).

Systematic Random (Grid) Sampling. A random sampling plan utilizing points predefined by a geometric pattern.

Target Compound/Analyte. The compound/analyte of interest in a specific method. The term also has been used in the Federal Register to denote compounds/analytes of regulatory significance.

Temporal Variation. Variation observed in chemical concentrations that is dependent on time.

Tentatively Identified Compound (TIC). Organic compounds detected in a sample that are not target compounds, internal standards or surrogates.

Toxicity Assessment. The toxicity assessment considers the following: 1) the types of adverse health effects associated with chemical exposures; 2) The relationship between magnitude of exposure and adverse effects; and 3) related uncertainties such as the weight of evidence of a particular chemical's carcinogenicity in humans.

Toxicological Threshold. The concentration at which a compound exhibits toxic effects.

Turnaround Time. The time from laboratory receipt of samples to receipt of a data package by the client.

Uncertainty. The variability in a process that may consist of contributions from sampling, analysis, review, and random error.

95% Upper Confidence Limit (UCL). A value that, when calculated repeatedly for different, randomly drawn subsets of site data, equals or exceeds the true mean 95% of the time.

Useful Range. That portion of the calibration curve that will produce the most accurate and precise results.

Variance. A measure of dispersion. It is the sum of the squares of the differences between the individual values and the arithmetic mean of the set, divided by one less than the number of values.

Viscosity. The physical property of a fluid that offers a continued resistance to flow.

Volatile Organics. The solid or liquid compounds that may undergo spontaneous phase change to a gaseous state at standard temperature and pressure.

Wavelength. The linear distance between successive maxima or minima of a wave form.

Weight-of-Evidence Classification. An EPA classification system for characterizing the extent to which available data indicate that an agent is a human carcinogen. Recently, EPA has developed weight-of-evidence systems for other kinds of toxic effects, such as developmental effects.

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