

Appendix A

Glossary of Definitions, Acronyms, Abbreviations and Symbols

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1.0 Standard Acronyms, Abbreviations, And Symbols

1.1 Units of weight and measure and their abbreviations

ampere	amp
centimeter	cm
cubic centimeter	cm ³
day	do not abbreviate
degree Celsius	°C
diameter	dia
foot	ft
gallon	gal
gram	g
grams per Liter	g/L
greater than	>
hour	h
hydrogen ion concentration, negative logarithm of	pH
inch	in.
inside diameter	ID
kilogram	kg
less than	<
linear dynamic range	LDR
liter	L
logarithm (common)	log
logarithm (natural)	log e or ln
maximum	max
meter	m
microgram	µg
microgram per liter	µg/L
microliter	µL
milliequivalent	meq
milligram	mg
milligram per gram	mg/g
milligram per liter	mg/L
milligram per milliliter	mg/mL
milliliter	mL
millimeter	mm
millimeter of mercury (pressure)	mm Hg
millisecond	ms
millivolt	mV
minimum	min
minute	min

molal	do not abbreviate
molar	M
mole	mol
month	do not abbreviate
most probable number	MPN
nanogram	ng
nanogram per liter	ng/L
nanometer	nm
normal	N
number	No. (only when followed by a numeral)
outside diameter	OD
part per billion	ppb
part per million	ppm
part per quadrillion	ppq
part per trillion	ppt
per	/ (when used in expressions with unit symbols)
percent	%
pico (prefix)	p
picogram	pg
pound	lb
pounds-per-square inch gauge	psig
quart	qt
relative centrifugal force	RCF
revolutions per minute	rpm
second	s
specific gravity	sp gr
micrometer	um
volt	V
volume (of a publication)	Vol. (only when followed by a numeral)
volume per unit volume	v/v
watt	W
weight per unit volume	w/v
year	do not abbreviate

1.2 Alphabetical Abbreviations

average	avg
calibration standard	CAL
equation	Eq
figure	Fig. (only when followed by a numeral)
Flame Ionization Detector	FID
gas chromatograph/chromatography	GC
gas chromatography/ mass spectroscopy	GC/MS
gel permeation chromatograph/ chromatography	GPC

high performance liquid chromatograph/chromatography	HPLC
high resolution GC	HRGC
high resolution MS	HRMS
Kuderna-Danish concentrator	K-D
linear dynamic range	LDR
mass spectrometer/spectrometry	MS
mass to charge ratio	m/z
meta	m
molecular ion	M
most probable number	MPN
ortho	o
page	p
pages	pp.
para	p
quality assurance	QA
quality control	QC
quart	qt
reference	Ref
relative centrifugal force	RCF
selected ion current profile	SICP
solid phase extraction	SPE
Soxhlet/Dean-Stark extractor	SDS

2.0 Definitions

- 2.1** Many of the following definitions were compiled from “SW-846 Test Methods for Evaluating Solid Wastes” (Section 3.1), the Environmental Methods Monitoring Council (EMMC) “Guidelines and Format for Methods to Be Proposed at 40 CFR Part 136 or Part 141” (Section 3.2) and “Standard Methods for the Examination of Water and Wastewater” (Section 3.3). Where applicable the definition is followed by the appropriate reference, SW-846, EMMC or SM, respectively.
- 2.2** Accuracy—the nearness of a result or the mean of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries (SW-846).
- 2.3** Analytical Batch—the basic unit for analytical quality control is the analytical batch. The analytical batch is defined as samples which are analyzed together with the same method sequence and the same lots of reagents and with the manipulations common to each sample within the same time period or in continuous sequential time periods. Samples in each batch should be of similar composition. (SW-846).
- 2.4** Blank—an artificial sample designed to monitor the introduction of artifacts into the process. For aqueous samples, reagent water is used as a blank matrix; however, a universal blank matrix does not exist for solid samples, and therefore, no matrix is used.

- The blank is taken through the appropriate steps of the process. See also Reagent Blank, and Field Blank (SW-846).
- 2.5** Calibration Check—verification of the ratio of instrument response to analyte amount, a calibration check is done by analyzing for analyte standards in an appropriate solvent. Calibration check solutions are made from a stock solution which is different from the stock used to prepare standards (SW-846).
- 2.6** Control Charts—three types of control charts commonly are used in laboratories. Means charts for standards, a means chart for background or reagent blank results and a range chart for replicate analyses. These charts are essential instruments for quality control. See warning and control limits (SM).
- 2.7** Control or Action Limit—plus or minus three times the standard deviation of the mean of a series of standards. These values are derived from stated values for standard reference materials, or replicate analyses of laboratory control standards or calibration check standards. If one measurement exceeds a control limit, repeat the analysis immediately. If the repeat is within the control limit, continue analyses; if it exceeds the control limit, discontinue analyses and correct the problem. See warning limits (SM).
- 2.8** Environmental or Field Sample—environmental or field samples are representative samples of any material (aqueous, non-aqueous, or multimedia) collected from any source for which determination of composition or contamination is requested or required (SW-846).
- 2.9** Field Blank—an aliquot of analyte-free water or solvents brought to the field in sealed containers and transported back to the laboratory with the sample containers. Trip blanks and equipment blanks are two specific types of field blanks. Trip blanks are not opened in the field. They are a check on sample contamination originating from sample transport, shipping and site conditions. Equipment blanks are opened in the field and the contents are poured appropriately over or through the sample collection device, collected in a sample container, and returned to the laboratory as a sample. Equipment blanks are a check on sampling device cleanliness (SW-846).
- 2.10** Initial precision and recovery (IPR)—four aliquots of the diluted PAR analyzed to establish the ability to generate acceptable precision and accuracy (EMMC).
- 2.11** Laboratory control sample (LCS)—see ongoing precision and recovery standard (OPAR).
- 2.12** Matrix spike (MS) and matrix spike duplicate (MSD)—aliquots of an environmental sample to which known quantities of the analytes are added in the laboratory. The MS and MSD are prepared and/or analyzed exactly like a field sample. Their purpose is to quantify any additional bias and imprecision caused by the sample matrix. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the MS and MSD corrected for background concentrations. Percent recoveries are calculated after background subtraction for each of

- the analytes detected. The relative percent difference between the samples is calculated and used to assess analytical precision (EMMC).
- 2.13** May—this action, activity or procedural step is neither required or prohibited (EMMC).
- 2.14** Method detection limit (MDL)—the lowest level at which an analyte can be detected with 99% confidence that the analyte concentration is greater than zero (EMMC).
- 2.15** Method quantification limit (MQL)—is the minimum concentration of a substance that can be measured and reported (SW-846).
- 2.16** Minimum level (ML)—the lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes and clean-up procedures have been employed (EMMC).
- 2.17** Must—this action, activity or procedural step is required (EMMC).
- 2.18** Must Not—this action, activity or procedural step is prohibited (EMMC).
- 2.19** Ongoing precision and recovery (OPR)—also called a laboratory control sample or check sample. A laboratory blank spiked with known quantities of analytes. The OPR is analyzed exactly like a sample. Its purpose is to assure that the results produced by the laboratory remain within the limits specified in the method for precision and accuracy (EMMC).
- 2.20** Precision—precision is the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analysis (SW-846).
- 2.21** Precision and recovery standard (PAR)—a secondary standard that is diluted and spiked to form the IPR and OPR (EMMC).
- 2.22** Practical quantitation limit (PQL)—is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions (SW-846).
- 2.23** Quality control sample (QCS)—a sample containing analytes of interest at known concentrations. The QCS is obtained from a source external to the laboratory or is prepared from standards obtained from a different source than the calibration standards. The purpose is to check laboratory performance using test materials that have been prepared independently from the normal preparation process (EMMC).
- 2.24** Reagent Blank—the reagent blank is an aliquot of analyte-free water or solvent analyzed with the analytical batch. Reagent, analyte-free, or laboratory pure water, means distilled

or deionized water or Type II reagent water which is free of contaminants that may interfere with the analytical test in question (SW-846).

- 2.25** Reagent Grade—analytical reagent (AR) grade, ACS reagent grade and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society (SW-846).
- 2.26** Relative response factor (RRF)—the relative response (peak area or height) of an internal standard of known concentration to the response of the analyte of interest.
- 2.27** Replicate Sample—replicate samples are samples prepared by dividing a sample into two or more separate aliquots. Duplicate samples are considered to be two replicates. Field duplicates are two environmental samples that are collected from the same sample location, at the same time using the same sampling equipment etc. and are a measure of the precision of field sampling equipment and procedures. Laboratory duplicates are samples prepared by taking two separate aliquots of the same sample to measure the precision of the analytical testing procedure and analysis (SW-846).
- 2.28** Response factor (RF)—the ratio of the instrument response, peak height or area responses, to the concentration of analyte injected.
- 2.29** Standard Curve—a curve which plots concentrations of known analyte standard versus the instrument response to the analyte (SW-846).
- 2.30** Surrogate Spike Recovery Standard—surrogates are organic compounds which are similar to analytes of interest in chemical composition, extraction, and chromatography, but which are not normally found in environmental samples. These compounds are spiked into all blanks, standards, samples and spiked samples prior to analysis. Percent recoveries are calculated for each surrogate (SW-846).
- 2.31** Warning Limits—plus or minus two times the standard deviation of the mean of a series of standards. These values are derived from stated values for standard reference materials, or replicate analyses of laboratory control standards or calibration check standards. If two out of three successive points exceeds a warning limit, analyze another sample. If the next point is less than the warning limit, continue analyses; otherwise, discontinue analyses and correct the problem. See control limits (SM).

3.0 References

- 3.1** “Test Methods for Evaluating Solid Wastes”, EPA Office of Solid Waste and Emergency Response, Washington, DC., November 1986, Third edition.
- 3.2** “Guidelines and Format for Methods to Be Proposed at 40 CFR Part 136 or Part 141” EPA, Office of Water Engineering and Analysis Division, EPA-821-B-96-003, Washington, DC, July 1996.

- 3.3** “Standard Methods for the Examination of Water and Wastewater”, 19th edition, American Public Health Association, Washington, DC. 1995 (Standard Method).