

## List of Acronyms and Definitions

**AA** is an acronym for **Atomic Absorption**, a methodology for the detection of metals. It describes a single wavelength/single element spectral analysis. **Flame AA** further specifies that an acetylene torch be used as a heat source. **Cold Vapor AA** is typically an spectral analysis used in the detection of Mercury vapor. It may be referred to as EPA 7470/7471 series.

**ACCURACY** is the nearness of a result or the mean of a set of results to the true or accepted value.

**B** is a laboratory flag when target analyte is detected in method blank at or above the method reporting limit or PQL.

**BATCH** is a group of samples which behave similarly with respect to the sampling or the testing procedures being employed and which are processed as a unit. A batch is group of 20 samples or fewer processed together in one analytical run.

**BNA** is an acronym for **Base Neutral Acid**. It is also commonly referred to as SVOCs or EPA 8270.

**CALIBRATION** refers to a plot of concentrations of known analyte standards versus the instrument response to the analyte. It is a reproducible reference point to which all sample measurements can be correlated. The appropriate linear or nonlinear coefficient for standard concentration to instrument response should  $> 0.995$ .

**CALIBRATION STANDARDS** are series of known standard solutions used by the analyst for calibration of the instrument. These are prepared by diluting a stock standard solution to produce working standards, which cover the working range of the instrument. One calibration standard should be at or below the reporting limit for the method.

**CAL DOHS** is an acronym for **California Department of Health Services**. CAL DOHS is the lead agency for the ELAP program and for setting environmental standards in the state.

**CAM** is an acronym for **California Administrative Manual**, also known as CCR or *California Code of Regulations*. CAM 17, 9 and 7 refer to lists of heavy metals identified in the manual.

**CAM 17** refers to a list of heavy metals described in the **California Administrative Manual** or *California Code of Regulations*. It is also referred to as Title 22 metals from CCR Title XXII. The list includes Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Selenium (Se), Silver (Ag), Thallium (Tl), Vanadium (V) and Zinc (Zn). There are other CAM lists such as CAM 7 and CAM 9, which are used less frequently and are shorter versions of the heavy metals list included in the CAM 17 list.



**CARBON RANGE** refers to the amount of petroleum hydrocarbons in a specific section of a chromatogram based on the retention time of pure alkanes such as hexane, heptane, octane etc., i.e. c6-c7, c7-c8, c8-c9 etc. Pure straight chain hydrocarbons (alkanes) have retention times that increase regularly with the number of carbon atoms. These retention times are used to divide a chromatogram into carbon ranges: C8-C10 indicates that we are talking about the part of the chromatogram between the retention time of Octane (eight carbon atoms) and Decane (ten carbon atoms). The TPH of a Carbon Range is defined as the area of a range of the sample compared to the area of the same range of the reference standard.

The carbon ranges of some typical products:

C5-C12	Gasoline
C8-C17	Jet A
C8-C17	JP5
C8-C18	Kerosene
C10-C28	Diesel
C18-C36	Motor Oil
C20-C38	Hydraulic Oil
C10-C40	Fuel Oil#6 (Bunker Oil)

**CCR** is an acronym for **California Code of Regulations**, also known as CAM or *California Administrative Manual*.

**CCR Title 22** refers to a list of heavy metals described in the California Administrative Manual or California Code of Regulations. See CAM 17 definition.

**CCV** is an acronym for **Continuing Calibration Verification**. CCV is a standard that periodically confirms that instrument response has not changed significantly from the initial calibration. This is prepared from the same stock solution that was used to prepare the calibration standards. Its concentration should be at or near the mid-range levels of the calibration curve. It is analyzed at the beginning and end of a sample run, or periodically during a run for example every after every 10<sup>th</sup> sample depending on the method requirements. Each method has its own set of acceptance criteria.

**CHLORINATED HYDROCARBONS** refer to the list of Volatile Organic Compounds contained in EPA 8010 and EPA 601. This list can also be referred to as Chlorinated Solvents or Purgeable Halocarbons.

**CHLORINATED SOLVENTS** refer to the list of Volatile Organic Compounds contained in EPA 8010 and EPA 601. This list can also be referred to as Chlorinated Hydrocarbons or Purgeable Halocarbons.

**CONTAMINATION** is a component of a sample or an extract that is not representative of the environment source of the sample. Contamination may stem from other samples, sampling equipment, while in transit, from laboratory reagents, laboratory environment, or analytical instruments.

**CONTINUING CALIBRATION** is the analysis of analytical standard at concentration within the calibration range to verify initial calibration of the system at a specified time frame.



**ACTIONS** are steps that are taken to remove the causes of an existing nonconformity or to make quality improvements. Corrective actions address actual problems. In general, the corrective action process can be thought of as a problem solving process.

**DETECTION LIMIT (DL)** is the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value.

**DUP or DUPLICATE** is a client assigned or randomly selected routine sample that is analyzed twice. Sample duplicate is processed independently through entire sample preparation and analytical process. A minimum of one duplicate must be included for each matrix type with each set of 20 or fewer samples.

**DVBE** is an acronym for **Disabled Veteran-owned Business Enterprise**. It denotes a business that is majority owned and managed by a disabled veteran. Certain government contracts require a percentage set aside to guarantee participation of disadvantaged businesses.

**E** is a laboratory flag when analyte exceeded the calibration range.

**ELAP** is an acronym for **Environmental Laboratory Accreditation Program**. ELAP is responsible for the certification of environmental laboratories in the state of California.

**EPA 8260** is the methodology for the identification of a specified list of Volatile Organic Compounds utilizing GC/MS (Gas Chromatography/Mass Spectrometry).

**EPA 8270** is the methodology for the identification of a specified list of Semi-Volatile Organic Compounds utilizing GC/MS (Gas Chromatography/Mass Spectrometry).

**FALSE NEGATIVE** is an analyte incorrectly reported as absent from the sample, resulting in potential risks from their presence.

**FALSE POSITIVE** is an item incorrectly identified as present in the sample, resulting in a high reporting value for the analyte of concern.

**GAS CHROMATOGRAPH** is the instrument used to separate analytes on a stationary phase within a chromatographic column.

**GC/MS** is an acronym for **Gas Chromatography/Mass Spectrometry**. It refers to methodology for the identification of compounds which utilizes Gas Chromatography to separate compounds and a Mass Spectrometer as detector.

**HOLDING TIME (Maximum Allowable Holding Time)** is the maximum times that samples may be held prior to analysis and still be considered valid or not compromised.

**H** is a laboratory flag when analyte was analyzed beyond holding time.



**IC** is an acronym for **Ion Chromatography**, a method which can be used for the detection of Phosphate (PO<sub>4</sub>), Sulfate (SO<sub>4</sub>), Chloride (Cl), Fluoride (F), Bromide (Br), Nitrite (NO<sub>2</sub>), and Nitrate (NO<sub>3</sub>).

**ICB** is an acronym for Initial Calibration Blank. ICB is a volume of reagent water or solvent treated in the same manner as the calibration standards. It is used to verify blank standard, and to check carry-overs and contamination.

**ICP** is an acronym for **Inductively Coupled Plasma**. Inductively Coupled Plasma Spectrometer is one technique for analyzing metal samples. An induction coil is wrapped around a quartz tube in which a stream of charge argon particles and sample solute is flowing. The sample must be in solution and is normally introduced through a nebulizer. The interaction between the induced magnetic field from the coil and the argon plasma create an extremely high temperature. The primary goal of ICP is to get elements to emit characteristic wavelength specific light which can then be measured.

**ICP/MS** is an acronym for **Inductively Coupled Plasma/Mass Spectrometry**. It refers to methodology for the detection of metals which utilizes an ICP as ion source and a mass spectrometer as detector. It may also be referred to as EPA Method 6020.

**ICS A** is an acronym for **Interference Check Solution A**. It is a standard that contains 500 ppm concentration of Aluminum, Calcium, Magnesium and 200 ppm of Iron which are the most frequent interferents in the ICP analysis.

**ICS AB** is an acronym for **Interference Check Solution AB**. It is a standard that contains 500 ppm concentration of Aluminum, Calcium, Magnesium and 200 ppm of Iron plus the other analytes at a certain level. Acceptance criteria is  $\pm 20\%$ .

**ICV** is an acronym for **Initial Calibration Verification** Standard. It is a standard used to confirm the accuracy of the instrument calibration. This is prepared from a different stock solution (i.e. different vendor or lot number) than was used to prepare the calibration standards. It is run after the initial calibration and each method has its own set of acceptance criteria.

**IDL** is an acronym for **Instrument Detection Limit**. IDL is the concentration equivalent to a signal, due to the analyte of interest, which is the smallest signal that can be distinguished from background noise by a particular instrument. The IDL should always be below the method detection limit, and is not used for compliance data reporting, but may be used for statistical data analysis and comparing the attributes of different instruments. IDL is determined on a clean matrix and analyzed without going through the preparatory step.

**INITIAL CALIBRATION** is the analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the detector to the target compounds.

**INTERNAL STANDARD CALIBRATION** is a calibration that involves the comparison of instrument responses from the target compounds in the sample to the responses of specific standards added to the sample or sample extract prior to injection. The ratio of



the peak area (or height) of the target compound in the sample or sample extract to the peak area (or height) of the internal standard in the sample or sample extract is compared to a similar ratio derived for each calibration standard. The ratio is termed the response factor (RF), and may also be known as a relative response factor in other methods.

**IS** is an acronym for **INTERNAL STANDARDS**. The internal standard is a compound that matches as closely, but not completely, the chemical species of interest in the samples.

**LCS** is an acronym for **Laboratory Control Sample**. It is an aliquot of laboratory reagent blanks to which known quantities of the method analytes are added in the laboratory. The LCS is analyzed exactly like a sample, and is used to evaluate ongoing laboratory performance and analyte recovery in a clean matrix. A minimum of one LCS must be included with each set of 20 or fewer samples.

**LEACHABLE** is a term which describes the ability of toxic materials to be extracted from the soil by water in a natural environment.

**LIMIT OF DETECTION (LOD)** is an estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific and may be laboratory-dependent.

**LIMIT OF QUANTITATION (LOQ)** The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence.

**LUFT** is an acronym for **Leaking Underground Fuel Tanks**. Regulations for treatment of such tanks, including required analytical testing, are laid out in federal regulations and state programs. LUFT 5 Heavy metals is a list of five metals commonly associated with underground tank problems.

**LUFT 5 HEAVY METALS** list includes Cadmium (Cd), Chromium (Cr), Nickel (Ni), Lead (Pb) and Zinc (Zn). The list is defined by the Federal Manual for treatment of Leaking Underground Fuel Tanks (LUFT) as metals of concern commonly associated with underground tank problems.

**MBE** is an acronym for **Minority-owned Business Enterprise**. It denotes a business that is majority owned and managed by a designated minority. Certain government contracts require a percentage set aside to guarantee participation of disadvantaged businesses.

**MDL** is an acronym for **Method Detection Limit**. One way to establish a Limit of Detection, defined as the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.



$$MDL = t_{(n-1, 1-\mu\gamma=0.99)} \times S$$

Where: S = standard deviation of the replicate analyses  
 $t_{(n-1, 1-\mu\gamma=0.99)}$  = the Student's t-value appropriate to a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom.

**METHOD BLANK or MB** is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. It is used to assess contamination resulting from the analytical process. A minimum of one method blank must be included with each set of 20 or fewer samples.

**MTBE** is an acronym for Methyl Tertiary Butyl Ether. It is an oxygenate added to reformulated gasoline that lowers tailpipe emission of CO and VOC's.

**mg/kg** is an acronym for **milligrams per kilogram**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 500 mg/kg diesel. It is normally used in conjunction with solid or soil samples.

**mg/L** is an acronym for **milligrams per liter**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 mg/L lead. It is normally used in conjunction with extracted samples involved in STLC or TCLP analysis which show the quantities of the constituent which are leachable.

**MS** is an acronym for **Matrix Spike**. It is an aliquot of environmental sample to which a known quantity of the method analyte is added in the laboratory. The spiking occurs prior to sample preparation and analysis. Spiking volume should be limited to 5% or less of sample volume. The MS is analyzed exactly like a sample, and is used to determine whether the sample matrix contributes bias to the analytical results. A minimum of one MS must be included with each set of 20 or fewer samples. The background concentration of the analyte in the sample matrix must be determined in a separate aliquot and the measured value in the Matrix Spike corrected for background concentration.

**MSD** is an acronym for **Matrix Spike Duplicate**. MSD A duplicate of the Matrix Spike used to determine the precision and bias of a method in a given sample matrix.

**ND** is an acronym for **None Detected**. ND is reported when an analyte was not found at detection limit.

**NELAC** is an acronym for **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.





**NELAP** is an acronym for **National Environmental Laboratory Accreditation Program**. The overall National Environmental Laboratory Accreditation Program of which NELAC is a part.

**NON-CONFORMANCE** is a departure of a quality characteristic from its intended level of state that occurs with severity sufficient to cause an associated product or service not to meet specified criterion.

**PERCENT RECOVERY or %R** is the numerical ratio of the amount of analyte measured by the laboratory method divided by the known amount of analyte added to the matrix to be analyzed.

**PERCENT DIFFERENCE or %D** is the comparison of two values. The percent difference indicates both the direction and magnitude of the comparison, i.e, the percent difference may be either negative, positive, or zero.

**ppb** is an acronym for **parts per billion**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 ppb diesel. It is normally used in conjunction with aqueous samples.

**ppm** is an acronym for **parts per million**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 500 ppm diesel. It is normally used in conjunction with solid or soil samples.

**ppt** is an acronym for **parts per trillion**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 ppt gasoline. It is normally used in conjunction with air samples.

**PQL** is an acronym for **Practical Quantitation Limits**. PQL is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the PQL is selected as the lowest non-zero standard in the calibration curve.

**PRECISION** is a measure of the reproducibility of a set of replicate results among themselves or the agreement among repeat observations made under the same conditions.

**PURGEABLE HALOCARBONS** refer to the list of Volatile Organic Compounds contained in EPA 8010 and EPA 601. This list can also be referred to as Chlorinated Solvents or Chlorinated Halocarbons.

**RPD** is an acronym for **Relative Percent Difference**. It is the ratio of the difference of two readings over its average. This is a means of determining the precision between two numbers.



$$RPD = \frac{(C_1 - C_2) * 100}{[(C_1 + C_2)/2]}$$

where  $C_1$  = the larger of the two observed values  
 $C_2$  = the smaller of the two observed values

**QA** is an acronym for **Quality Assurance**. QA is a planned system of activities (program) whose purpose is to provide assurance of the reliability and defensibility of the data.

**QC** is an acronym for **Quality Control**. QC is a routine application of procedure for controlling the monitoring process. QC is the responsibility of all those performing the hands-on operations in the laboratory.

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$$RPD = \frac{(C_1 - C_2) * 100}{[(C_1 + C_2)/2]}$$

where  $C_1$  = the larger of the two observed values  
 $C_2$  = the smaller of the two observed values

**RESOLUTION** is the separation between peaks on a chromatogram.

**S** is a laboratory flag when surrogates or spikes are outside control limits due to matrix interference.

**SERIAL DILUTION** is the dilution of a sample by a known factor. When corrected by the dilution factor, the diluted sample must agree with the original undiluted sample within specified limits. Serial dilution may reflect the influence of interferents.

**SEMIVOLATILE COMPOUNDS** are compounds amenable to analysis by extraction with an organic solvent. Used synonymously with base neutral acid or extractable compounds.

**SIM** is an acronym for **selected ion monitoring**. SIM sets the mass selective detector to repeatedly scan a few selected ions rather than a full spectrum. In the acquisition method (GC/MS SIM or Gas Chromatography/Mass Spectrometry using Selected Ion Monitoring), the selected ions can be changed to reflect the desired compound to be detected. The detector scans for a primary, secondary and tertiary ion set unique to the compound of interest in a particular retention time window. It is an invaluable tool for positive identification of a compound resulting in considerable reduction in false positives and exceptionally low detection limits.

**SOLUBLE** is a term used for the characterization of metals as hazardous waste. It is often used interchangeably with "WET" or "STLC" when referring to the amount of a metal that is leachable, i.e. soluble lead. The extraction process takes 48 hours.





**STANDARD ADDITION or Method of Standard Addition (MSA)** is the addition of three increments of a standard solution (spikes) to sample aliquots of the same size. Measurements are made on the original and after each addition. The slope, x-intercept and y-intercept are determined by least-squares analysis. The analyte concentration is determined by the absolute value of the x-intercept. Ideally, the spike volume is low relative to the sample volume. Standard addition may counteract matrix effects; it will not counteract spectral effects.

**STANDARD DEVIATION** is the square root of the variance of a set of values.

$$S = \frac{\sum (Y_i - Y)^2}{n - 1}$$

where S = Standard Deviation  
Y<sub>i</sub> = measured value of replicate  
Y = mean of replicate measurements  
n = number of replicates

**STLC** is an acronym for **Soluble Threshold Limit Concentration** and is used mainly in the characterization of metals as hazardous waste. It is often used interchangeably with "WET" or "soluble" when referring to the amount of a metal that is leachable, i.e. STLC lead. In correct scientific terms STLC is only the extract concentration limits as defined in CCR Title 22. The extraction process takes 48 hours.

**SURROGATE** is an organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples.

**SVOCs** is an acronym for **Semi-Volatile Organic Compound**. It is also commonly referred to as BNAs (Base Neutral Acid) or EPA 8270.

**TCLP** is an acronym for **Toxicity Characteristic Leachate Procedure** and is used to characterize the mobility of both organic and inorganic analytes present in liquid and solid wastes. It is an extraction method prescribed by CFR (Code of Federal Regulations.) The extraction process takes 18 hours.

**TDS** is an acronym for **Total Dissolved Solids** or filterable residue.

**TPH** is an acronym for **Total Petroleum Hydrocarbons**. It is a measure of the total amount of fuel present in the sample, i.e., TPH-gasoline or TPH-diesel. TPH results can be quantified or calculated as:

- Totals as specific fuels types, i.e. TPH as diesel, crude or gasoline
- Totals in specific carbon ranges, i.e. 500 ppm c10-c25

**TSS** is an acronym for **Total Suspended Solids** or non-filterable residue.

**TTLC** is an acronym for **Total Threshold Limit Concentration** and is mainly used in the quantification of metals. It is often used interchangeably with "total", i.e. TTLC or



total lead. In correct scientific terms TTLC refers to the soil concentration limits as defined in CCR Title 22.

**µg/L** is an acronym for **micrograms per liter**. It is a unit measure for concentration used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 µg/L diesel. It is normally used in conjunction with aqueous samples.

**VOLATILE COMPOUNDS** are compounds amenable to analysis by the purge and trap techniques. Used synonymously with purgeable compounds.

**VOAs** is an acronym for **Volatile Organic Analysis or Analytes**. VOA is often used when speaking about the analysis of volatile organics. The acronym is rarely used and has been replaced by VOC's. VOA vials refer to the 40 ml containers used for aqueous sampling of volatile compounds.

**VOCs** is an acronym for **Volatile Organic Compounds**. The term VOCs commonly refers to the list of compounds contained in EPA Method 8240 or the longer list of EPA Method 8260.

**WBE** is an acronym for **Woman-owned Business Enterprise**. It denotes a business that is majority owned and managed by a woman. Certain government contracts require a percentage set aside to guarantee participation of disadvantaged businesses.

**WET** is an acronym for **Waste Extraction Test** and is used in the classification of metals as hazardous waste. It is often used interchangeably with "STLC" or "soluble" when referring to the amount of a metal that is leachable, i.e. WET lead. The correct scientific nomenclature is CAL-WET or California Waste Extraction Test as defined in CCR Title 22. The extraction process takes 48 hours.

**ZHE** is an acronym for **Zero Headspace Extraction**. It is the TCLP extraction method prescribed by CFR (Code of Federal Regulations) for VOCs (Volatile Organic Compounds). The extraction process takes 48 hours.

#### DOCUMENT REFERENCE

- 1) DoD QSM version 4.1, April 22, 2009.
- 2) NELAC Standard 2003.
- 3) USEPA, Contract Laboratory Program, Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, OLM03.0.
- 4) USEPA, Contract Laboratory Program, Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, ILM04.0.
- 5) USEPA, SW-846 Update III, Chapter One.

