GLOSSARY

Acute Toxicity Test is a test to determine the concentration of effluent or ambient waters that causes an adverse effect (usually death) on a group of test organisms during a short-term exposure (e.g., 24, 48, or 96 hours). Acute toxicity is measured using statistical procedures (e.g., point estimate techniques or a *t*-test).

Acute-to-Chronic Ratio (ACR) is the ratio of the acute toxicity of an effluent or a toxicant to its chronic toxicity. It is used as a factor for estimating chronic toxicity on the basis of acute toxicity data, or for estimating acute toxicity on the basis of chronic toxicity data.

Ambient Toxicity is measured by a toxicity test on a sample collected from a receiving waterbody.

ANOVA is analysis of variance.

Average Monthly Limit (AML) is the calculated average monthly limit of waste load allocation assigned by a State or EPA for a particular facility.

CCC are water quality criteria for chronic exposure (criteria continuous concentrations).

Chronic Toxicity Test is a short-term test in which sublethal effects (e.g., reduced growth or reproduction) are usually measured in addition to lethality. Chronic toxicity is defined as TUc = 100/NOEC or TUc = 100/ECp or ICp.

CMC are water quality criteria for acute exposures (criteria maximum concentration).

Coefficient of Variation (CV) is a standard statistical measure of the relative variation of a distribution or set of data, defined as the standard deviation divided by the mean. It is also called the relative standard deviation (RSD). The CV can be used as a measure of precision within (within-laboratory) and between (between-laboratory) laboratories, or among replicates for each treatment concentration.

Confidence Interval is the numerical interval constructed around a point estimate of a population parameter.

Effect Concentration (EC) is a point estimate of the toxicant concentration that would cause an observable adverse effect (e.g., death, immobilization, or serious incapacitation) in a given percent of the test organisms, calculated from a continuous model (e.g., Probit Model). EC25 is a point estimate of the toxicant concentration that would cause an observable adverse effect in 25 percent of the test organisms.

Hypothesis Testing is a statistical technique (e.g., Dunnett's test) for determining whether a tested concentration is statistically different from the control. Endpoints determined from hypothesis testing are NOEC and LOEC. The two hypotheses commonly tested in WET are:

> **Null hypothesis (H$_o$)**: The effluent is not toxic.
> **Alternative hypothesis (H$_a$)**: The effluent is toxic.

Inhibition Concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a non-lethal biological measurement (e.g., reproduction or growth), calculated from a continuous model (i.e., Interpolation Method). IC25 is a point estimate of the toxicant concentration that would cause a 25-percent reduction in a non-lethal biological measurement.

Instream Waste Concentration (IWC) is the concentration of a toxicant in the receiving water after mixing. The IWC is the inverse of the dilution factor. It is sometimes referred to as the receiving water concentration (RWC).

LC50 (lethal concentration, 50 percent) is the toxicant or effluent concentration that would cause death in 50 percent of the test organisms.

Lowest Observed Effect Concentration (LOEC) is the lowest concentration of an effluent or toxicant that results in adverse effects on the test organisms (i.e., where the values for the observed endpoints are statistically different from the control).

Long-term Averages (LTAs) of pollutant concentration or effluent toxicity are calculated from waste load allocations (WLAs), typically assuming that the WLA is a 99th percentile value (or another upper bound value) based on the lognormal distribution. One LTA is calculated for each WLA (typically an acute LTA and a chronic LTA for aquatic life protection). The LTA represents expected long-term average performance from the permitted facility required to achieve the associated WLA.

Maximum Daily Limit (MDL) is the calculated maximum WLA assigned by a State or EPA for a particular facility.

Minimum Significant Difference (MSD) is the magnitude of difference from control where the null hypothesis is rejected in a statistical test comparing a treatment with a control. MSD is based on the number of replicates, control performance, and power of the test.

Mean Square Error (MSE) is the average dispersion of the items around the treatment means. It is an estimate of a common variance, the within variation, or variation among observations treated alike. [Also referred to as error mean square (EMS).]

Mixing Zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented.

No Observed Effect Concentration (NOEC) is the highest tested concentration of an effluent or toxicant that causes no observable adverse effect on the test organisms (i.e., the highest concentration of toxicant at which the values for the observed responses are not statistically different from the controls).

National Pollutant Discharge Elimination System (NPDES) program regulates discharges to the nation's waters. Discharge permits issued under the NPDES program are required by EPA regulation to contain, where necessary, effluent limits based on water quality criteria for the protection of aquatic life and human health.

Power is the probability of correctly detecting an actual toxic effect (i.e., declaring an effluent toxic when, in fact, it is toxic).

Precision is a measure of reproducibility within a data set. Precision can be measured both within a laboratory (within-laboratory) and between laboratories (between-laboratory) using the same test method and toxicant.

Quality Assurance (QA) is a practice in toxicity testing that addresses all activities affecting the quality of the final effluent toxicity data. QA includes practices such as effluent sampling and handling, source and condition of test organisms, equipment condition, test conditions, instrument calibration, replication, use of reference toxicants, recordkeeping, and data evaluation.

Quality Control (QC) is the set of more focused, routine, day-to-day activities carried out as part of the overall QA program.

Reasonable Potential (RP) is where an effluent is projected or calculated to cause an excursion above a water quality standard based on a number of factors.

Reference Toxicant Test is a check of the sensitivity of the test organisms and the suitability of the test methodology. Reference toxicant data are part of a routine QA/QC program to evaluate the performance of laboratory personnel and the robustness and sensitivity of the test organisms.

Significant Difference is defined as a statistically significant difference (e.g., 95 percent confidence level) in the means of two distributions of sampling results.

Statistic is a computed or estimated quantity such as the mean, standard deviation, or coefficient of variation.

Test Acceptability Criteria (TAC) are specific criteria for determining whether toxicity test results are acceptable. The effluent and reference toxicant must meet specific criteria as defined in the test method (e.g., for the *Ceriodaphnia dubia* survival and reproduction test, the criteria are as follows: the test must achieve at least 80 percent survival and an average of 15 young per surviving female in the controls).

Total Maximum Daily Load (TMDL) is a determination of the amount of a pollutant, or property of a pollutant, from point, nonpoint, and natural background sources, including a margin of safety, that may be discharged to a water quality-limited waterbody.

***t*-Test** (formally Student's *t*-Test) is a statistical analysis comparing two sets of replicate observations, in the case of WET, only two test concentrations (e.g., a control and 100 percent effluent). The purpose of this test is to determine if the means of the two sets of observations are different [e.g., if the 100-percent effluent concentration differs from the control (i.e., the test passes or fails)].

Type I Error (alpha) is the rejection of the null hypothesis (H_o) when it is, in fact, true (i.e., determining that the effluent is toxic when the effluent is not toxic).

Type II Error (beta) is the acceptance of the null hypothesis (H_o) when it is not true (i.e., determining that the effluent is not toxic when the effluent is toxic).

Toxicity Test is a procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect of a specific chemical or effluent on exposed test organisms.

Toxic Unit-Acute (TUa) is the reciprocal of the effluent concentration (i.e., TUa = 100/LC50) that causes 50 percent of the organisms to die by the end of an acute toxicity test.

Toxic Unit-Chronic (TUc) is the reciprocal of the effluent concentration (e.g., TUc = 100/NOEC) that causes no observable effect (NOEC) on the test organisms by the end of a chronic toxicity test.

Toxic Unit (TU) is a measure of toxicity in an effluent as determined by the acute toxicity units (TUa) or chronic toxicity units (TUc) measured. Higher TUs indicate greater toxicity.

Toxicity Identification Evaluation (TIE) is a set of procedures used to identify the specific chemicals causing effluent toxicity.

Toxicity Reduction Evaluation (TRE) is a site-specific study conducted in a step-wise process designed to identify the causative agents of effluent toxicity, isolate the source of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Variance is a measure of the dispersion in a set of values, defined as the sum of the squared deviations divided by their total number.

Whole Effluent Toxicity (WET) is the total toxic effect of an effluent measured directly with a toxicity test.

Waste Load Allocation (WLA) is the portion of a receiving water's total maximum daily load that is allocated to one of its existing or future point sources of pollution.

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