

Summary Descriptions of Quality Control (QC) Tests and Significance of the Results

•**Check Standards.** The check standard (sometimes called a *laboratory control sample* (LCS) or *spiked blank*, is a sample of known concentration in a "clean" matrix such as reagent grade water or "clean" sand. The lab would probably report the result as a percentage of the known value, and probably call it "Percent Recovery" or "%R." Alternatively, they might state the true value, and report the actual analytical result. Good labs do a check standard in each batch as a routine matter, and repeat the standard every ten or twenty samples within a batch.

•**Method blanks.** The method blank is a sample of reagent grade water or "clean" sand subjected to the entire sample prep and analytical procedure. The lower the result, the more assurance that contamination in the lab is not a problem. Good labs do method blanks (if applicable) in every batch as a routine matter, always at the beginning of a batch, and sometimes doing a second blank at the end.

•**Matrix spike/Matrix spike duplicate (MS/MSD).** The MS is a known amount of target analyte "spiked" into an actual environmental sample. The lab calculates the amount of spiked material recovered from the sample and reports it as "%R." They can do an MS duplicate to give an indication of *within-batch analytical precision at the concentration of the spiked sample*, and in a "real" sample as opposed to a "clean" sample. Labs normally do not provide MS results unless requested to do so by the lab client. Results for the MS should be used only as an indicator of matrix interference and not as an indicator of lab performance.

•**Duplicates.** An analytical duplicate is a second, ideally identical, aliquot of an environmental sample analyzed in the same batch and in exactly the same manner as the original aliquot. Duplicate results provide an indication of *within-batch analytical precision at the concentration of the environmental sample*. Good labs do at least one duplicate in each batch, given enough sample. A **field** duplicate, in addition to checking analytical precision, also checks precision of sampling.

•**Surrogates.** For the surrogate, the lab "spikes" all samples within the batch (except the blank) with a known amount of a chemical similar to the target analyte, but one that is not found in the environment. This would be reported as %R, just like the check standard and MS. Some analytical methods for organics include analysis of surrogates...other methods do not.

•**Lab Splits.** For lab splits, the lab would split a sample, analyzing one aliquot in their lab, and sending the second aliquot to another lab that would use the same technique to analyze their aliquot, and the two results would be compared. Results must be considered carefully because there is no way of knowing which, if either, lab did a "good" job without evaluating other QC test results, and if the **other** QC test results are available, lab split results are not needed. Labs do not split samples as a routine matter.

•**Reference Materials.** Standard or certified reference materials (SRM/CRM) are real-world environmental samples that have been analyzed by many labs and for which an "accepted" value has been determined. SRM/CRM are usually provided by NIST or some other widely recognized provider of standards. SRM and CRM are relatively expensive and generally redundant if the lab analyzes a check standard **and** MS sample.

•**Proficiency Testing Samples.** Samples provided by a disinterested party external to the lab, concentrations of which are known to the provider but not to the lab. Results are scored by the provider.