Ambient Water Reporting Limits - An Explanation

For surface water to be evaluated for compliance with Texas Surface Water Quality Standards ("TSWQS") and screening levels, data must be reported at or below specified levels. To ensure data are collected at or below these levels, required ambient water reporting limits ("AWRL"), previously known as minimum analytical levels ("MAL") were established early in the Clean Rivers Program.

Many of the MALs were originally based on widely available analytical techniques and not necessarily on the data needs of the TCEQ's surface water quality programs. A workgroup was established in the summer of 2001 to review the MALs to ensure reporting limit requirements were properly aligned with the TCEQ's data needs. The term MAL was confusing for a variety of reasons, so as a first step, the workgroup adopted the term AWRL to more accurately reflect the process.

To set AWRLs appropriately, the workgroup first looked at all the ways data would be compared against the TSWQSs. For example, the TCEQ evaluates surface water for its use as public water supply. If this was the only "use" the TCEQ evaluates, the AWRL for nitrate-N would be set as a factor of the maximum contaminant limit ("MCL") for drinking water (i.e., 10 mg/L). However, as another part of the evaluation process, the TCEQ looks at "nutrient concerns." For this purpose, the TCEQ workgroup set the AWRL for nitrate-N at .02 mg/L. This level of analytical sensitivity is needed to gain an understanding of nutrient dynamics of both eutrophic and non-eutrophic waters. Ultimately, the lowest standard or screening level was used to set each AWRL. The parameters for which AWRLs have been established are available electronically as part of this web site.

While the AWRL is the highest acceptable level that can be reported for a given parameter, Basin Planning Agencies should consider all possible uses of the data and specify the limit of quantitation ("LOQ") accordingly. The requirement for running an LOQ check standard replaces the method for demonstrating the laboratory's ability to quanititate at the reporting limit ("RL") in previous quality assurance project plans ("QAPP"). This requirement specified that the calibration response at the low standard be used to calculate at a recovery factor between 75-125%. This is no longer required.

- **The laboratory's LOQ for each analyte must be at or below the AWRL as a matter of routine practice**

- **The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check standard for each batch of CRP Samples are analyzed.**

Limit of Quantitation – The laboratory will analyze a calibration standard (if applicable) at the LOQ on each day Clean Rivers Program samples are analyzed. Calibrations including the standard at the LOQ will meet the calibration requirements of the analytical method or corrective action will be implemented.

LOQ Sediment and Tissue Samples – When considering LOQs for solid samples and how they apply to results, two aspects of the analysis are considered: (1) the LOQ of the sample, based on the "real-world" in which moisture content and interferences

Revised 7/18/2012

affect the result and (2) the LOQ in the QAPP which is a value less than or equal to the AWRL based on an idealized sample with zero % moisture.

The LOQ for a solid sample is based on the lowest non-zero calibration standard (as are those for water samples), the moisture content of the solid sample, and any sample concentration or dilution factors resulting from sample preparation or clean-up.

To establish solid-phase LOQs to be listed in Table A7.1 of the QAPP, the laboratory will adjust the concentration of the lowest non-zero calibration standard for the amount of sample extracted, the final extract volume, and moisture content (assumed to be zero percent moisture). Each calculated LOQ will be less than or equal to the AWRL on the dry-weight basis to satisfy the AWRL requirement for sediment and tissue analyses. When data are reviewed for consistency with the QAPP, they are evaluated based on this requirement. Results may not "appear" to meet the AWRL requirement due to high moisture content, high concentrations of non-target analytes necessitating sample dilution, etc. These sample results will be submitted to the TCEQ with an explanation on the data summary as to why results do not appear to meet the AWRL requirement.

LOQ Check Standard – An LOQ check standard consists of a sample matrix (e.g., deionized water, sand, commercially available tissue), free from the analytes of interest, spiked with verified known amounts of analytes, or a material containing known and verified amounts of analytes. It is used to establish intra-laboratory bias to assess the performance of the measurement system at the lower limits of analysis. The LOQ check standard is spiked into the sample matrix at a level less than or near the LOQ for each analyte for each batch of CRP samples are run.

The LOQ check standard is carried through the complete preparation and analytical process. LOQ Check Standards are run at a rate of one per analytical batch. A batch is defined as samples that are analyzed together with the same method and personnel, using the same lots of reagents, not to exceed the analysis of 20 environmental samples.

The percent recovery of the LOQ check standard is calculated using the following equation in which %R is percent recovery, S_R is the sample result, and S_A is the reference concentration for the check standard:

$$\%R = (S_R/S_A) \times 100$$

Measurement performance specifications are used to determine the acceptability of LOQ Check Standard analyses as specified in Table A7.1 of the CRP QAPP shell.

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