

SOME WATER QUALITY ISSUES THAT WE DON'T WANT TO THINK ABOUT
Or
ARE WE REALLY MEASURING WHAT WE THINK WE ARE?

Arthur J. Horowitz
U.S. Geological Survey
Georgia Water Science Center
Atlanta, GA

Some of the most common sample media used in environmental monitoring [e.g., filtered water (dissolved), whole water (suspended sediment)] are fraught with ambiguities and many are based on operational definitions. As such, they are far from the 'absolute' values that people believe they represent. As a result, reported values must be accompanied by a clear explanation of how they were obtained; otherwise, end-users are likely to wind up comparing and/or combining/concatenating data that actually should be segregated.

In many long-term monitoring programs that involve sampling and subsequent analysis, scheduling is calendar- rather than hydrologically based because it is convenient. However, a clear linkage exists between hydrologic conditions and actual environmental measurements. As such, it is incumbent on program coordinators to collect samples over a wide range of hydrologic conditions to encompass the likely range of parameter/constituent variance. This could be accomplished using calendar-based sampling provided the sampling program was sufficiently long (e.g., 10 to 15 years). However, this view is based on two presumptions: (1) that conditions at the monitoring site remain essentially the same for that long period of time, and (2) that there are sufficient resources to support the monitoring effort for that same long period. In today's world, neither presumption is supportable.

Modeling and the use of surrogates has become a panacea in environmental studies/monitoring programs for a variety of reasons including resource limitations and a desire to obtain more data than could be collected using more conventional sampling and analysis techniques. However, end-users of such data must maintain an awareness that hydrologic systems are dynamic. As such, the use of models and surrogates still requires the use of conventional sampling and analytical procedures to ensure their continued viability as well as a means for evaluating estimation errors.

Lastly, many of the common laboratory analytical procedures currently used in environmental monitoring programs can be inappropriate because they actually do not measure what we think they do! In the end, it becomes the responsibility of the reporting agency to institute adequate QA/QC procedures to ensure that adequate measurements are being made. As a result, failure to maintain an adequate QA/QC program can lead to a variety of unpleasant political/social/legal consequences.