

## Novel Monitoring Data Presentation Method Provides a Simplified View of the Approach to Compliance Levels

Amy H. Bass, *Les Porterfield*, P.E. (lporterfield@teainconline.com),  
John D. Schell, Ph.D., and Bradley F. Droy, Ph.D. (TEA Inc., Santa Rosa Beach, FL, USA)

**Background/Objectives.** The presentation of monitoring data for groundwater remediation sites generally involves numerous data plots that can be tedious to present and interpret. This can be particularly problematic where there are multiple constituents and, as with the example site to be presented, multiple target goals for each contaminant. A simplified, straightforward method of data presentation has been developed to clearly show the decrease of the various contaminant concentrations to compliance levels, each to the appropriate and relevant compliance level, simultaneously on a single plot. Where the contaminants represent a parent compound and the degradation products (as at the example site), presentation on a single plot in this manner can also clearly illustrate the ongoing dynamics of the degradation process. This results in more succinct discussion in the monitoring report and easier interpretation by reviewers – a win-win outcome!

**Approach/Activities.** The data analysis is based on a parameter we have termed the Relative Exceedance (REx). For each Result that exceeds the relevant Goal, the Relative Exceedance is calculated as shown:

$$\text{Relative Exceedance (REx)} = (\text{Result} - \text{Goal}) / \text{Goal}$$

The Goal might be the same for all the Results, or it might vary based on well depth, location, exposure potential, or other consideration, for each Result. The REx values for each constituent are then averaged to derive the Mean Relative Exceedance (MREx) for that constituent, which is the parameter presented in the data plots (as a function of time). The time-related behavior of the MREx values for each constituent, along with the time-related Number of Exceedances (NEx) (the total number of Results that exceeded the relevant Goal), provides useful information regarding the approach toward compliance and presents it in a clearly understood manner. As the constituent concentrations approach the Goals, the MREx and NEx plots will approach zero – simple! When all the constituent MREx and NEx plots go to zero, compliance has been obtained, and it's time to begin site closure.

**Results/Lessons Learned.** The MREx method was developed to facilitate interpretation of the groundwater monitoring data for a site in central Florida, which had been impacted by trichloroethene (TCE) in the surficial aquifer. The site had undergone in-situ remedial action (to destroy TCE and accelerate the subsurface degradation process) and was entering the monitoring-only phase for TCE and its degradation products, cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC). Site-wide and off-site monitoring was ongoing, with wells clusters that characterized groundwater at three depths (shallow, intermediate, and deep) within the surficial aquifer. This site presented particularly challenging data presentation needs for the following reasons: (a) three constituents of concern, related through the degradation process; (b) two sets of risk-based goals – one set applicable to just the shallowest groundwater and the other set applicable to all groundwater depths; (c) consideration of state criteria for “poor-quality” groundwater, which were conditionally applicable (with institutional controls); and (d) presentation of state criteria for drinking-water quality groundwater, the ultimate remedial goal for all groundwater of the state. This site will be used as a case study to explain the application of the MREx method and to illustrate the value it can provide in simplifying and clarifying the data presentation and interpretation.