Sampling of Groundwater at the UCD/DOE LEHR Superfund Site

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At the March 10, 2009 UCD/DOE LEHR Superfund site RPM meeting, questions were raised about the comparative reliability of using of filtered vs unfiltered samples of groundwater for characterizing groundwater. We have been concerned about and involved in the issue of reliable sampling of groundwater by monitoring wells for many years. In 1983 we published the paper:

Lee, G. F., and Jones, R. A., "Guidelines for Sampling Groundwater," *Journ. Water Pollut. Control Fed.* **55(1)**:92-96 (1983).
http://www.gfredlee.com/Groundwater/GroundwaterSampling.pdf

in which we discussed essential aspects of the proper sampling groundwater to reliably assess the characteristics of the groundwater. While the filtration of groundwater samples prior to analysis is allowed at the LEHR site by the RPMs, some regulatory agencies in other areas will not allow the use of filtered samples for determining chemical concentrations in a groundwater.

Typically, the presence of turbidity in a groundwater sample is an indication of improper well construction and/or improper sampling. Lee and Jones-Lee (1983) discussed that filtering a turbid groundwater sample can do more than simply eliminate solid material; the process of filtration can change the concentrations of dissolved chemicals in the groundwater sample by affecting the liquid/solid ratio during filtration. It can also increase the concentration of "dissolved" chemicals over that present in the aquifer for those particulate chemicals that are present in solids that pass through the filters typically used. They concluded that a turbid groundwater-well sample should be analyzed for total and dissolved (filtered) constituents; the true concentration of the constituent in the aquifer water would likely lie between the two results.

For any constituent that tends to sorb on solids, results of analyses conducted on filtered groundwater samples from the LEHR site cannot be considered reliable representations of the concentrations of dissolved constituents in the LEHR site groundwater. Because this is a problem at a number of monitoring wells at the LEHR site, turbidity should be measured on all groundwater samples from the LEHR site. For groundwater well samples that are turbid, efforts should be made to alter the well sampling procedures to result in less turbid samples. Where this cannot be achieved, a new groundwater well should be constructed.