

You are invited to attend the following USGS internal “Brown-Bag Web Seminar”— the third in a 7-part series on regional assessments of Principal Aquifers

Trace Elements in the Glacial Aquifer System

To see more information about the meeting, including its agenda, or to join the meeting, go to <http://usgs.webex.com>

When: Thursday, October 25, 2007 from 1:00-2:00 pm CDT (2:00 - 3:00 pm EST)

Presenter: George Groschen, Illinois USGS WSC

How to connect:

Website: Go to <http://usgs.webex.com> (password: manganese)

Audio line: (641) 715-3200 participant code = 558655#

Meeting Number: 716 262 108

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Abstract

Concentrations of dissolved trace elements can vary over several orders of magnitude across local well networks as well as across regions of the US. Characterization of this variability is a step in determining the regional probability of these trace elements exceeding drinking-water or other human health standards.

Strontium and barium are the most frequently detected and usually the highest concentrations. Iron and manganese are the next most commonly detected and next highest in concentrations. Iron concentrations are the most variable with respect to the range of variations (both within local networks and aquifer-wide) and with respect to the disparity between magnitude of concentrations (detections) and the frequency of samples below reporting limits (non-detections). There are some geographic patterns that primarily reflect climate effects. The highest concentrations of several elements were found in the West-central glacial framework area (High Plains and northern Plains areas). The West-central area generally has the lowest precipitation and highest evapotranspiration in the glacial aquifer system.

There are several important deviations from the presumed redox sensitivity of selected trace elements.

Redox effect ranges were:

$\text{Cu} > \text{As} > \text{Co} = \text{Se} > \text{Ba} = \text{Cr} = \text{Mo} > \text{Ni} = \text{U} > \text{Sr} = \text{Pb} > \text{Li} = \text{V} > \text{Zn}$

Antimony, arsenic, chromium, cobalt, molybdenum, selenium, uranium, and vanadium are considered typically "redox sensitive".

Manganese most often exceeded its benchmark (LHA) in the glacial aquifer system wells. Of the 1,590 wells sampled for manganese, only 556 are private or public drinking-water supplies and of those, 9.9 percent (55) exceeded the manganese LHA. Fewer wells had concentrations of arsenic, selenium, or uranium that exceeded relevant health-based benchmarks in part because only about 847 samples were analyzed for most trace elements. Most concentrations that exceeded a relevant health-based benchmark were from West-central area (Iowa, Minnesota, North and South Dakota, Nebraska, and Kansas) wells, however, there is little geographical pattern to the wells with concentrations of concern.