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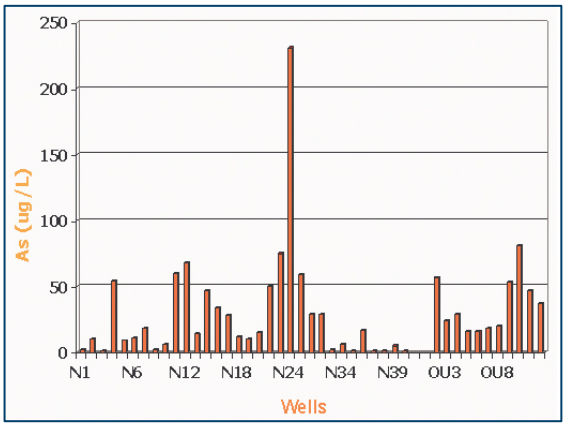
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
GROUND WATER AND ECOSYSTEMS RESTORATION RESEARCH

Public-Supply Well-Head Arsenic Remediation in Western Cleveland County, Oklahoma

Background and Objectives

Studies have indicated that arsenic concentrations greater than the newly proposed EPA maximum contaminant level (MCL) of 10 micrograms per liter (ug/L) occur in specific parts of numerous aquifers around the United States. One such aquifer is the Central Oklahoma aquifer. Concentrations as high as 230 ug/L have been reported in some drinking water supply wells from this aquifer. Arsenic-bearing sandstones appear to be the source of the arsenic. It may be possible to isolate these arsenic-bearing zones from water supply wells, enabling production of water that complies with drinking water standards.



Average Arsenic Concentrations

More data and methods to assess the specific distribution of arsenic in aquifers are needed to improve predictions for arsenic occurrence in water supply aquifers. Research is also needed to assess whether the existing water supply wells can be retrofitted to isolate arsenic-bearing strata in these aquifers. It is hypothesized that geologic mapping, together with detailed hydrogeochemical investigations, will yield correlations that predict the occurrence of high arsenic. If verified, this approach can be used in other aquifers to predict the location of high-arsenic zones and to retrofit existing water supply wells.

If successful, this approach would eliminate the need for well head treatment of arsenic for drinking water supplies. This would significantly reduce the costs of bringing public water supplies into compliance with the proposed lower drinking water standards for arsenic. In addition, an understanding of arsenic distribution in the area would improve chances of installing new wells that meet drinking water standards. This approach to characterizing aquifers and modifying existing drinking water supply wells could be transferred to other aquifers and water supply systems throughout the United States.

Approach

The approach will consist of:

- Measuring, describing, and photographing Garber sandstone and shale outcrops in the study area, and mapping sandstone and mudstone distribution from outcrops, cuttings, cores, and existing logs
- Modeling ground water flow paths
- Mapping the distribution of arsenic concentration in ground water based on existing and new measurements of discrete level sampling of water production wells
- Drilling a test hole at a site where high arsenic concentrations probably occur in isolatable layers

Accomplishments

A work plan was submitted and approved in early 2003. As of November 2003, measurements are near completion regarding the Garber sandstone and shale outcrops in the study area and mapping of sandstone and mudstone distribution from outcrops, cuttings, cores, and existing logs. Sampling was initiated in the first production well in September 2003.

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