

Arsenic in Drinking Water

Part 3. Occurrence of Arsenic in U.S. Waters

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Only recently has a substantial amount of data become available on the concentrations of arsenic in U.S. drinking water supplies. Most of these data have been accumulated by the state regulatory agencies responsible for monitoring drinking waters. Since the arsenic standard has been 50 µg/l, some state agencies have only recorded arsenic concentrations in excess of that concentration. Others have been limited by the sensitivity of the analytical techniques used for the arsenic analysis. As a result, much of the available arsenic data are 'below the limits of detection.'

USEPA has compiled the available arsenic data from the 25 states that have conducted monitoring programs. In turn, the Natural Resources Defense Council (NRDC) has utilized the USEPA data to calculate 'best estimates' of the concentrations of arsenic in finished drinking waters for communities in each of the 25 states. In many instances, only a single analysis had been conducted.

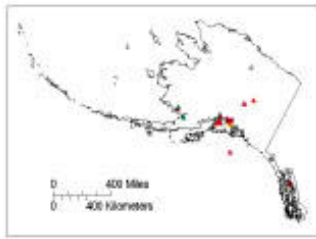
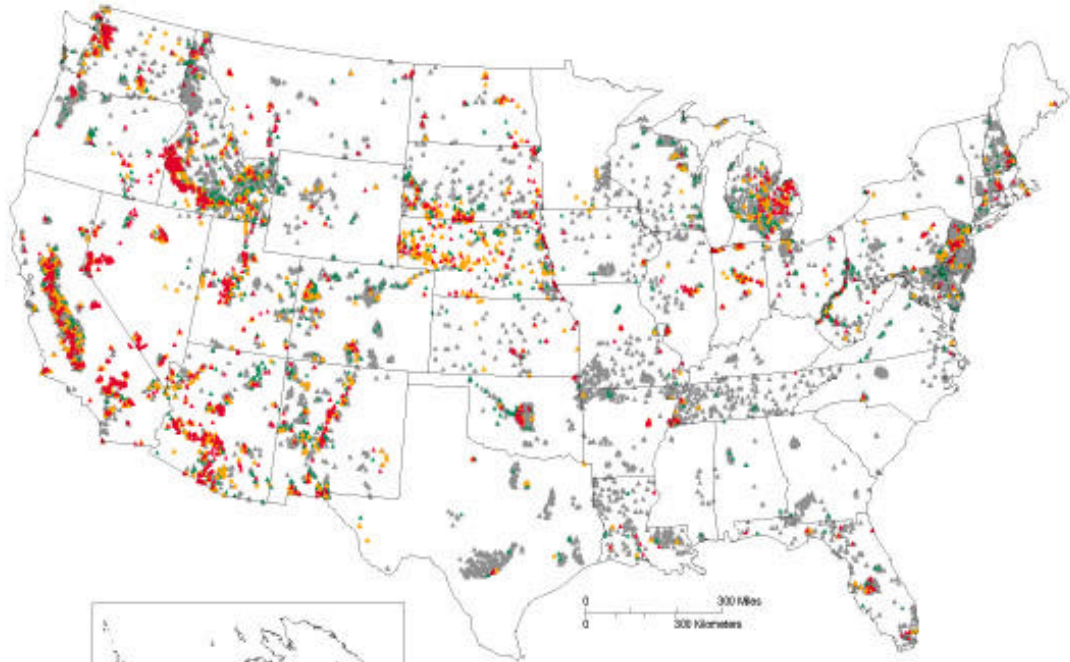
Recognizing that these data are still tentative and limited, the graphs prepared for this review are an initial attempt to visualize the impact of various arsenic standards on the community water supplies of some of the states for which arsenic data has been reported. The graphs present the array of estimated arsenic concentrations, from lowest to highest, in the water systems or, in some cases, in well waters surveyed.

These arrays allow visualization of the impact of arsenic standards of 3 µg/l, 5 µg/l, 10 µg/l, 20 µg/l and 50 µg/l on the proportion of water supplies potentially impacted by the final arsenic standard. For example, assuming the data is representative and the NRDC 'best estimates' are an effective guide, about 40% of the 155 New Hampshire water supplies surveyed to date would be impacted by a 10 µg/l MCL. Alternately, only 8% of Missouri supplies, many of which are untreated groundwaters derived from limestone strata, might be affected.

A comprehensive USGS review (Water-Resources Investigations Report 99-4279) of a range of existing water quality data indicate that most of the water utilities that would be affected by a lowered arsenic standard are in the western, midwestern and northeastern states. USGS estimates that 1% of the 54,000 U.S. public water supplies currently exceed 50 µg/l; 3% exceed 20 µg/l; 8% exceed 10 µg/l; and 14% exceed 5 µg/l arsenic.

It is almost certain that more comprehensive arsenic data will become available as communities and regulatory agencies attempt to resolve MCL compliance issues. Only then will spatial and temporal variations in arsenic concentrations, including seasonal effects and the effects of antecedent rainfall, become evident.

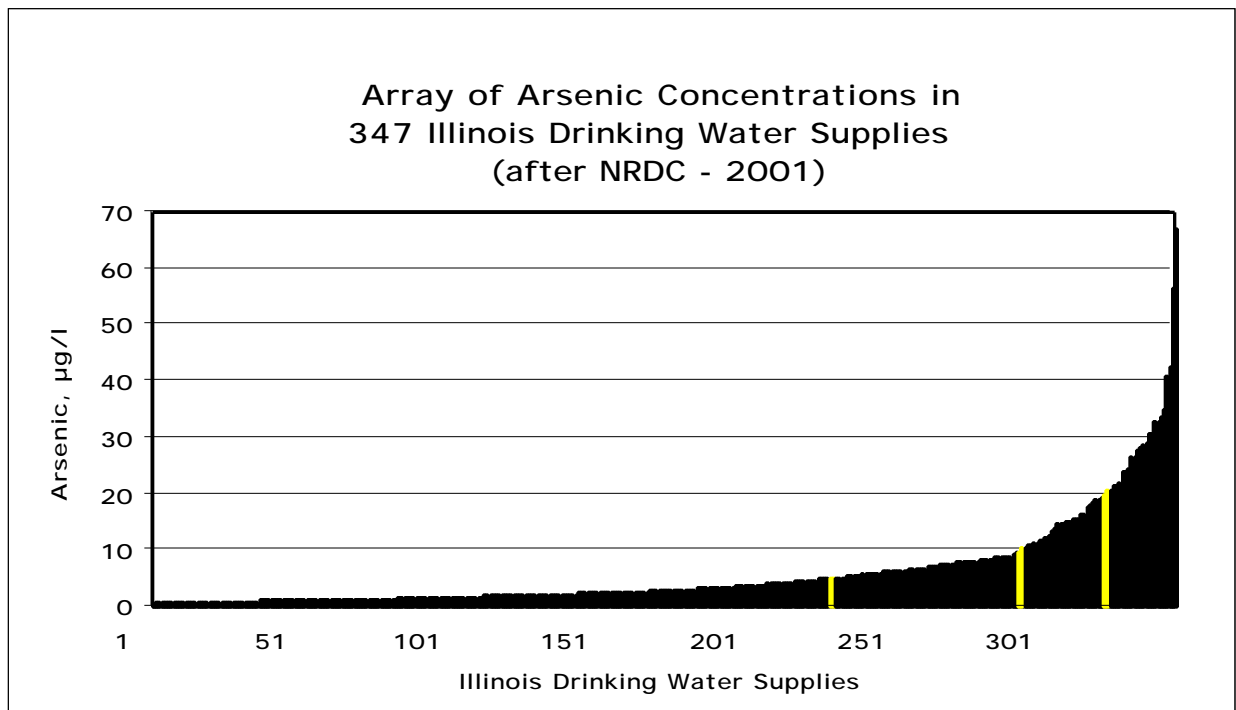
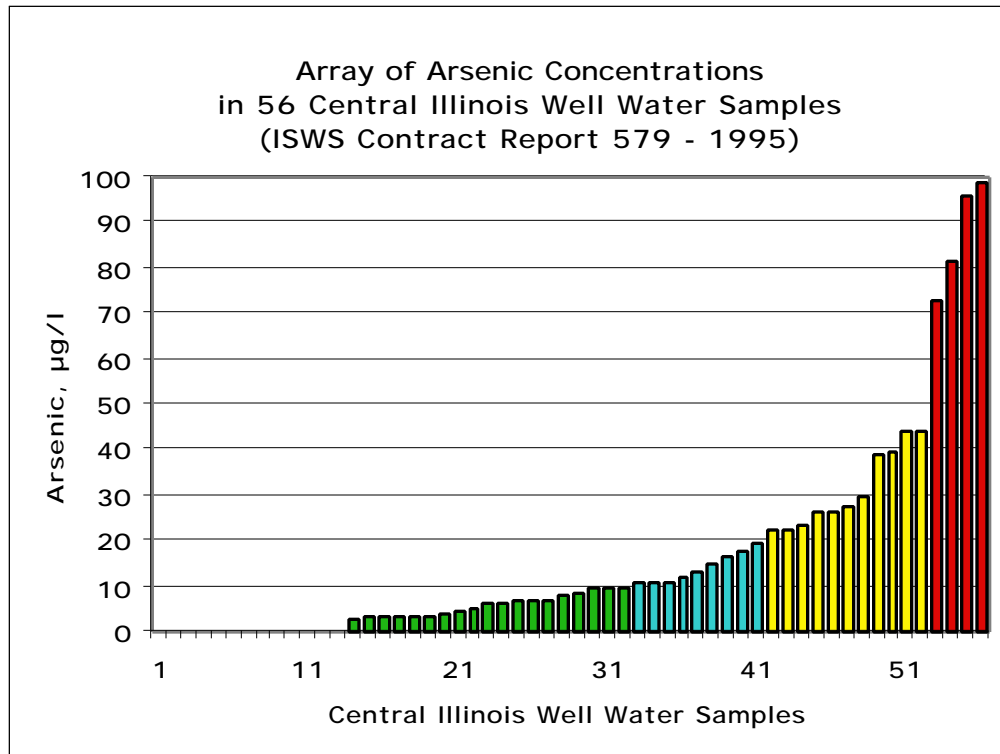
Part 3 of this review will summarize the methods available for the removal of arsenic from drinking water sources.



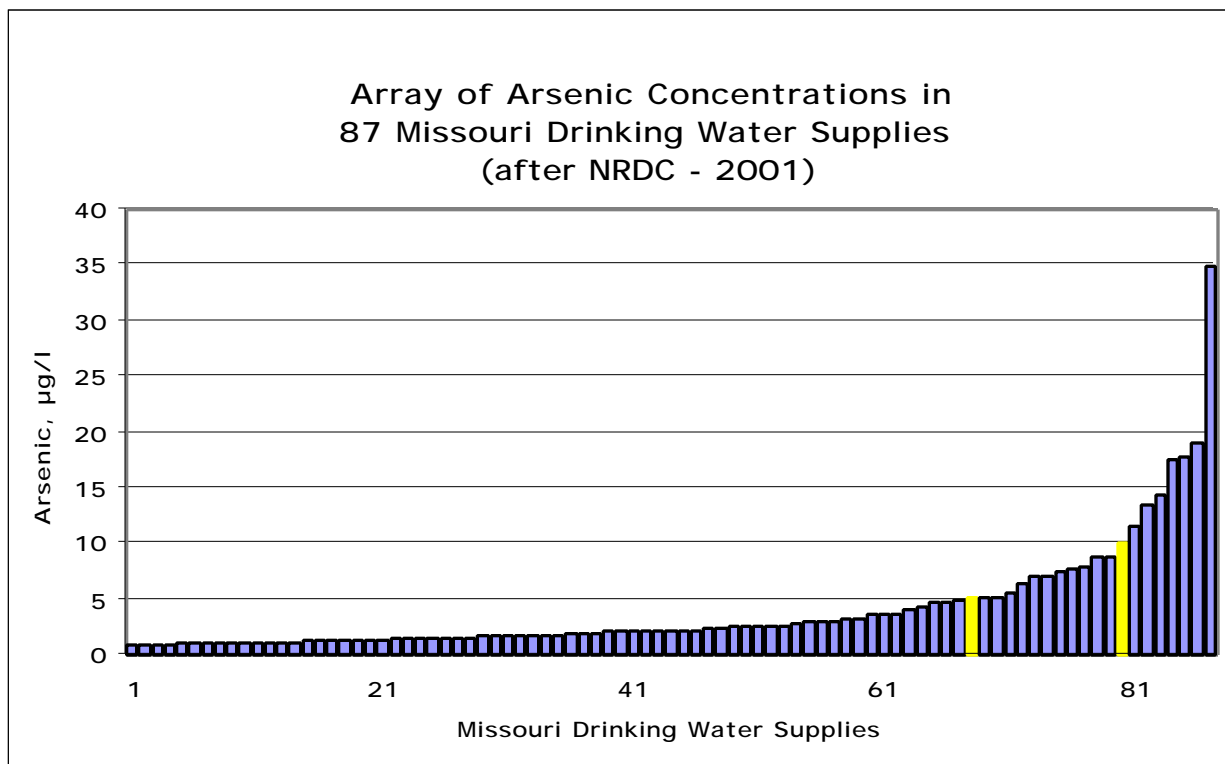
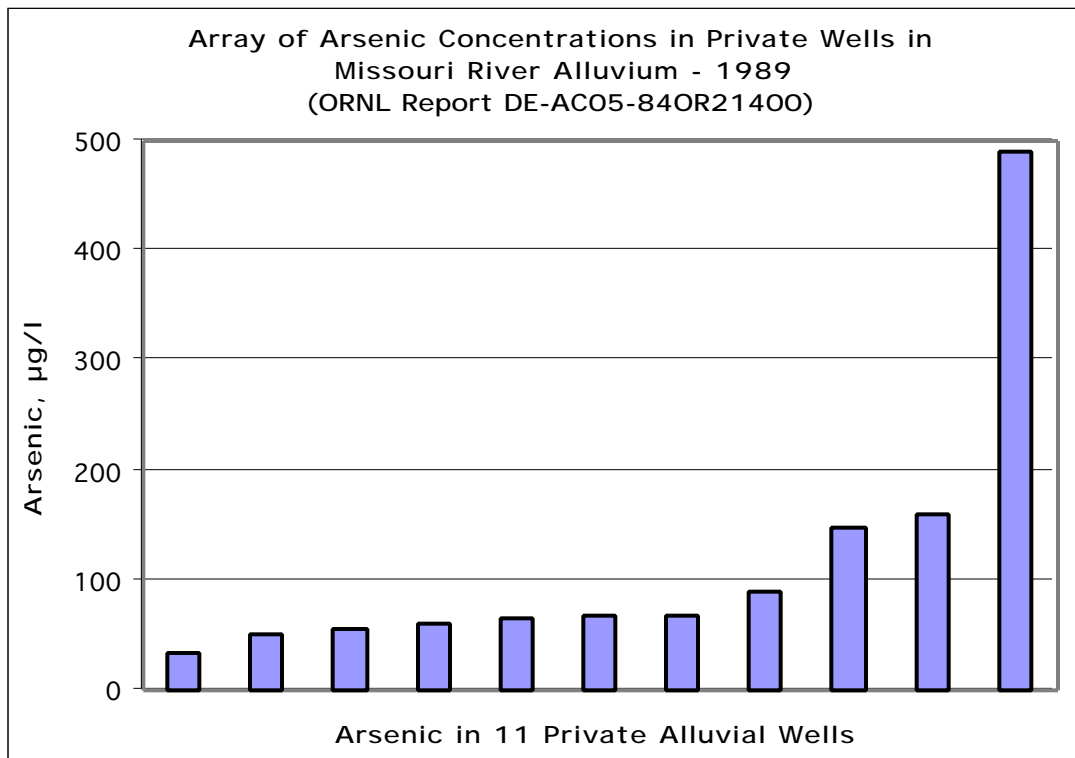
EXPLANATION
 Arsenic in water from
 18,850 wells and springs

- ▲ Greater than 10 µg/L
- ▲ 5 to 9.9 µg/L
- ▲ 3 to 4.9 µg/L
- ▲ Less than 2.9 µg/L

Occurrence of Arsenic - Illinois

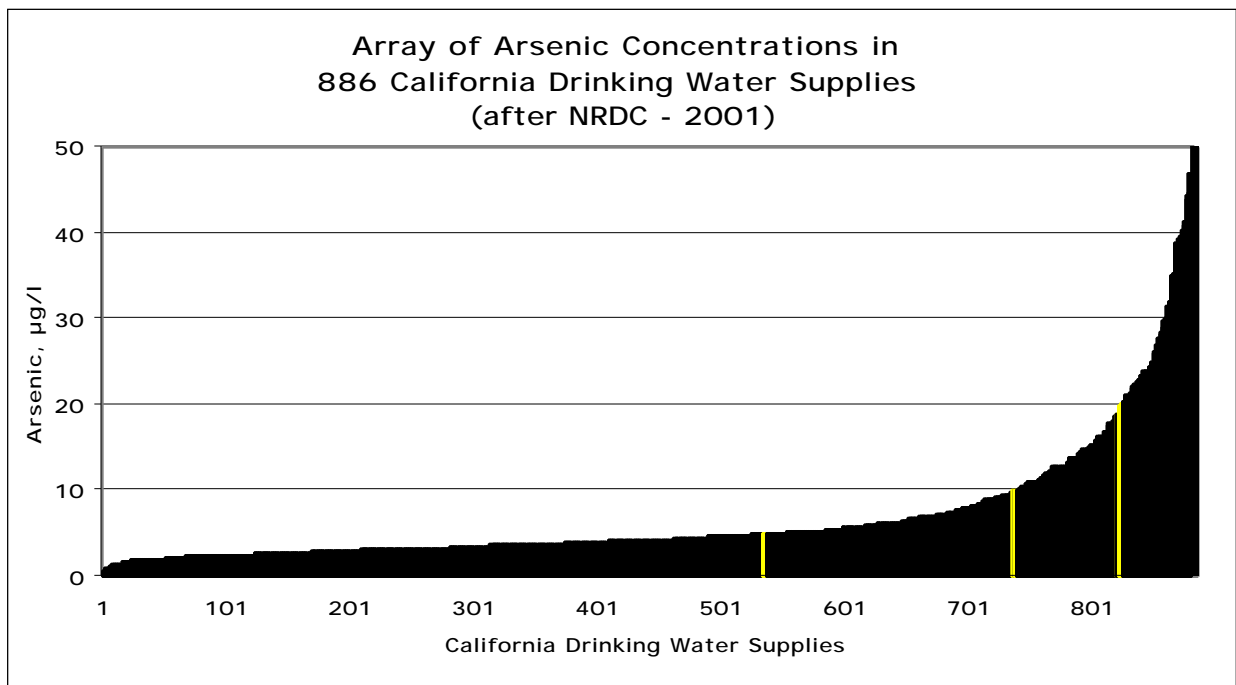
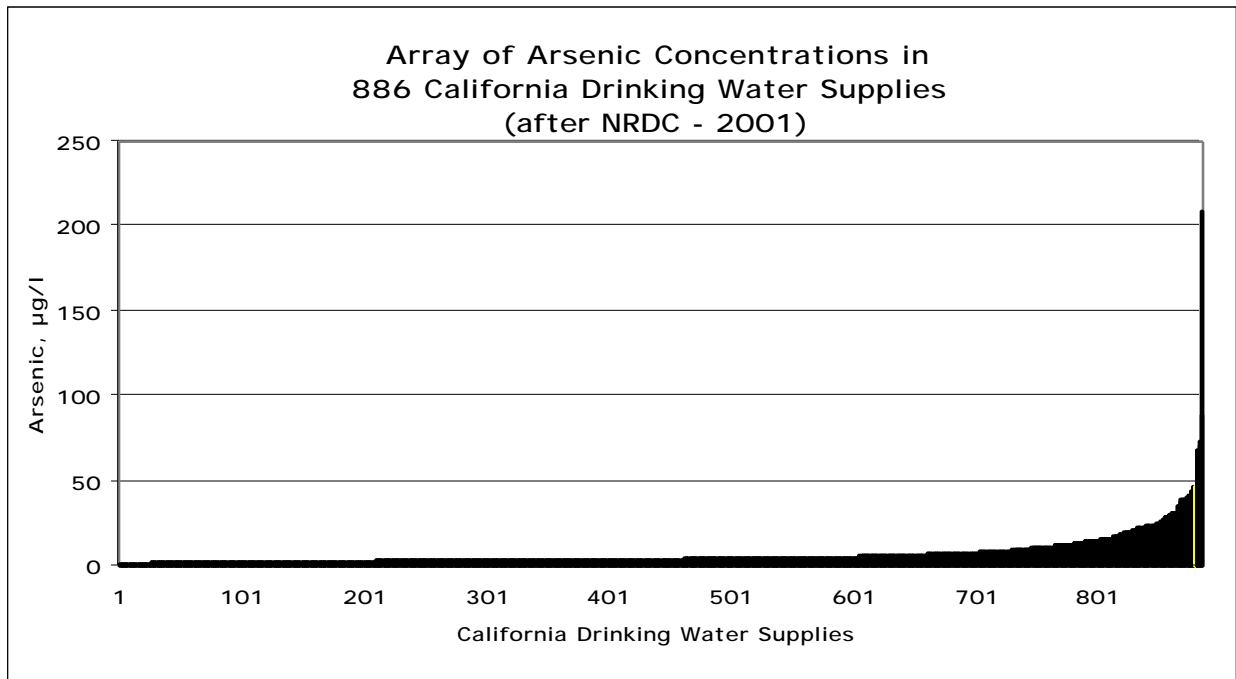


Occurrence of Arsenic - Missouri



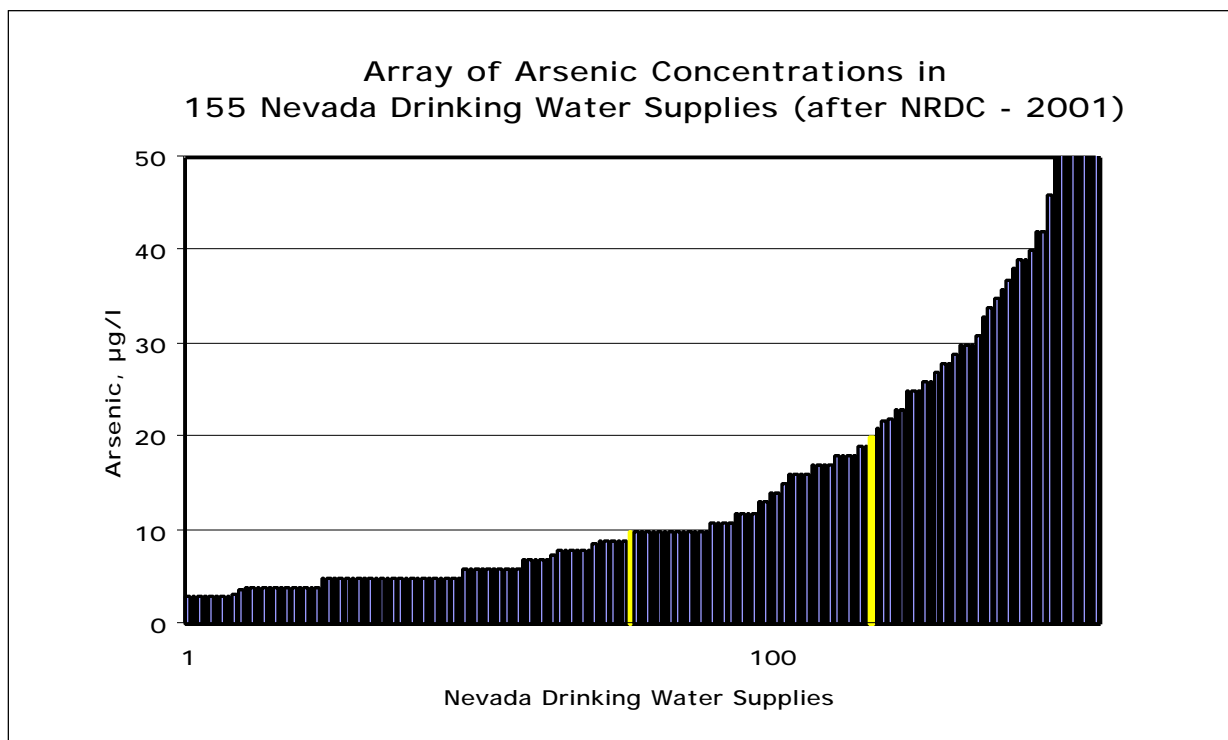
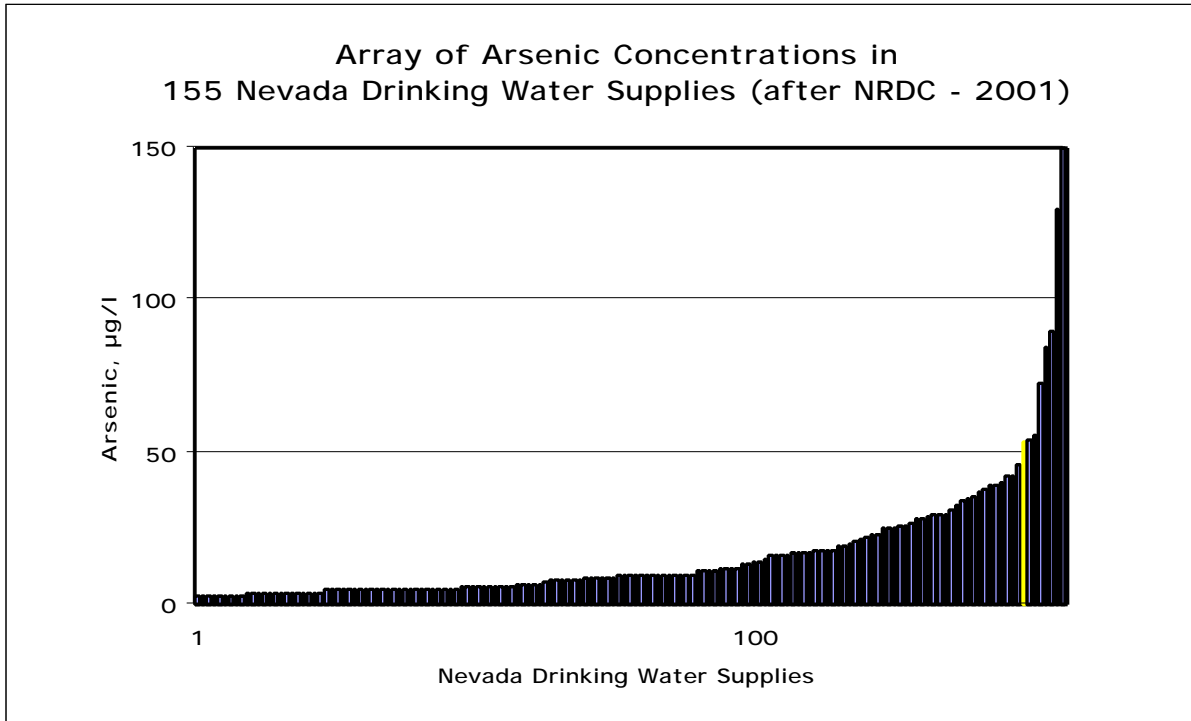
Occurrence of Arsenic - California

Elevated (60 µg/l) levels of arsenic are present in Crowley Lake, the first reservoir in the Los Angeles Aqueduct which provides 75% of the water supply for the 3.2 million residents of Los Angeles. The arsenic derives from geothermal inputs from Hot Creek, an indirect tributary. As a result of this influx, the arsenic in the influent to the Sylmar, CA water filtration plant averages 20 µg/l. To meet an ocean discharge standard of 12 µg/l, the arsenic is being removed by the addition of ferric chloride to co-precipitate iron hydroxide and arsenic. (Kneebone, P.E. and Hering, J.G., Behavior of Arsenic and other Redox-Sensitive Elements in Crowley Lake, CA; A Reservoir in the Los Angeles Aqueduct System, Environmental Science and Technology, 2000, 34, 4307-4312).

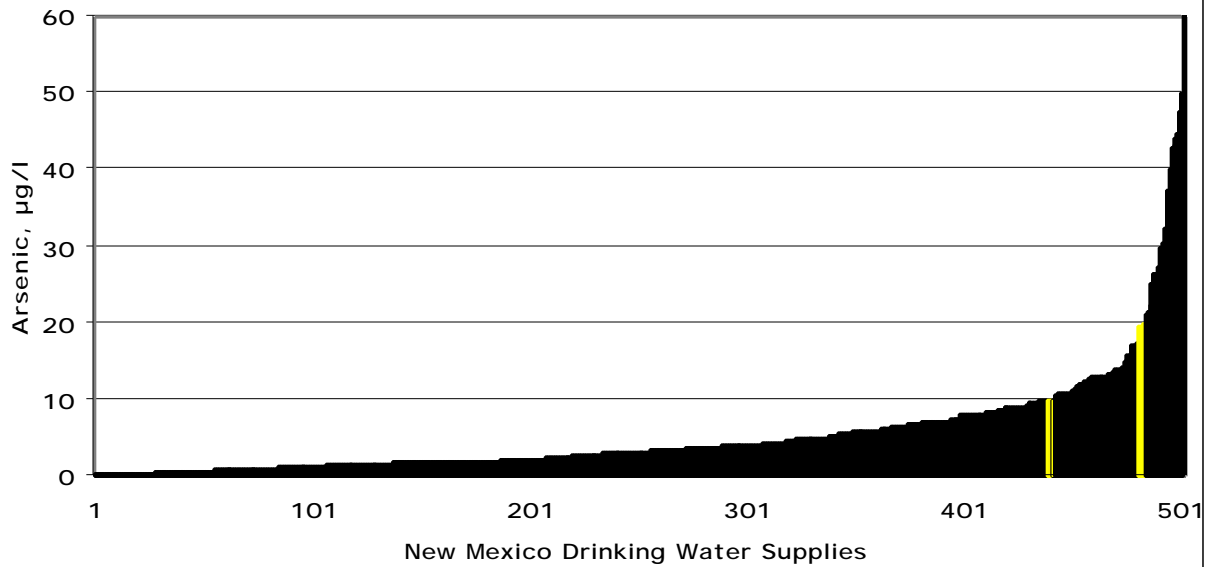


Occurrence of Arsenic - Nevada

USEPA has called for Fallon, Nevada, (Population: 8,300) to reduce arsenic in their drinking water from 100 $\mu\text{g}/\text{l}$ to the current standard of 50 $\mu\text{g}/\text{l}$. The state epidemiologist is investigating whether six cases of leukemia in children, diagnosed from March to July, 2000 are related to arsenic ingestion since no other county in Nevada has ever reported more than one case in a year.



Array of Arsenic Concentrations in
503 New Mexico Drinking Water Supplies
(after NRDC - 2001)



Array of Arsenic Concentrations in
155 New Hampshire Drinking Water Supplies
(after NRDC - 2001)

