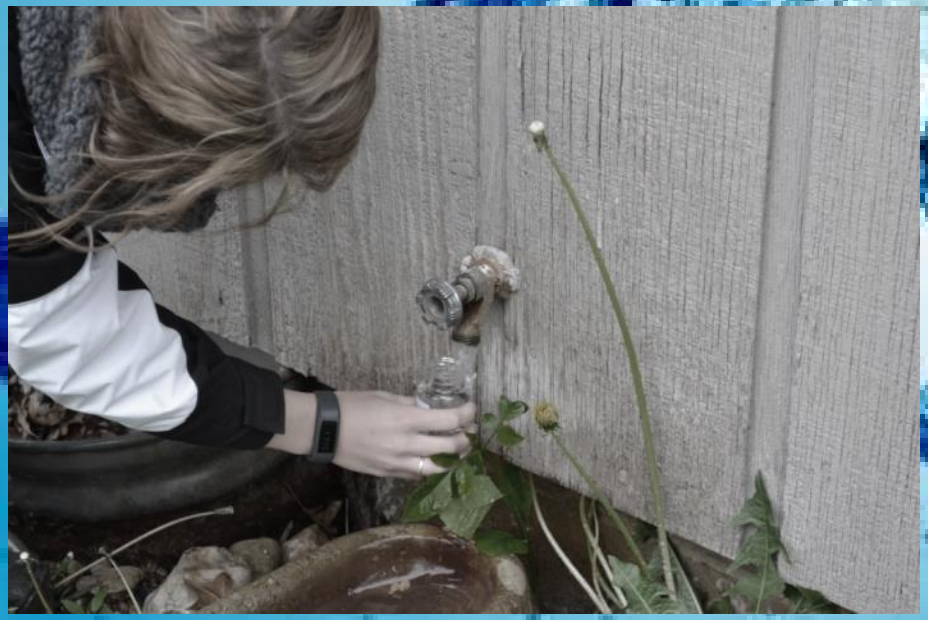
Arsenic Testing: Lessons Learned in Cerro Gordo County



History—2001

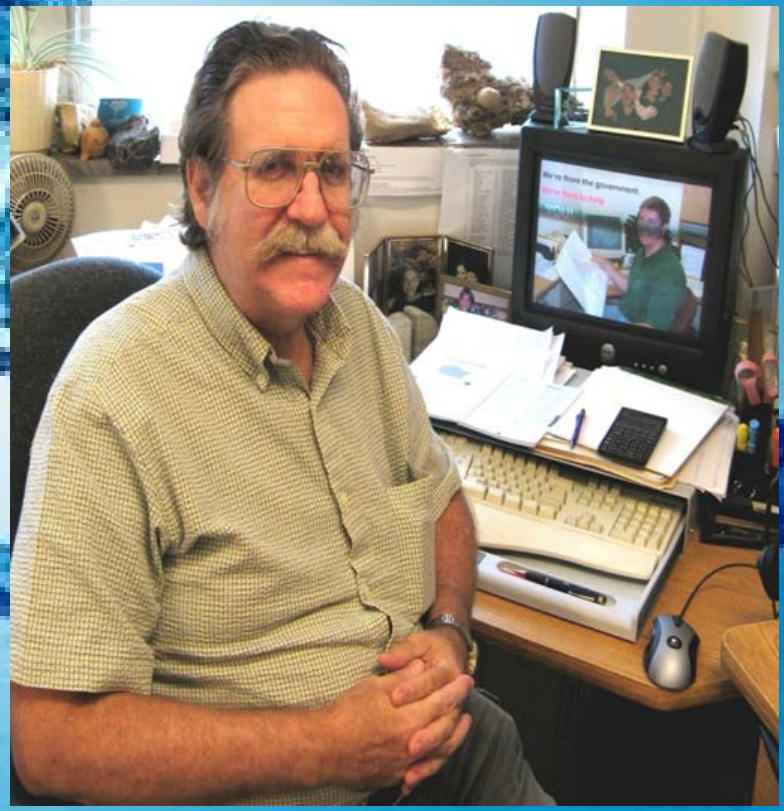
- EPA sets a new MCL for municipal water supplies from 10 ppb from 50 ppb.
- 540 ppb, highest concentration of arsenic in a well in Iowa found in Cerro Gordo County
- IDNR does further investigation near two public wells just south of Mason City (one of these was the well that had 540 ppb)

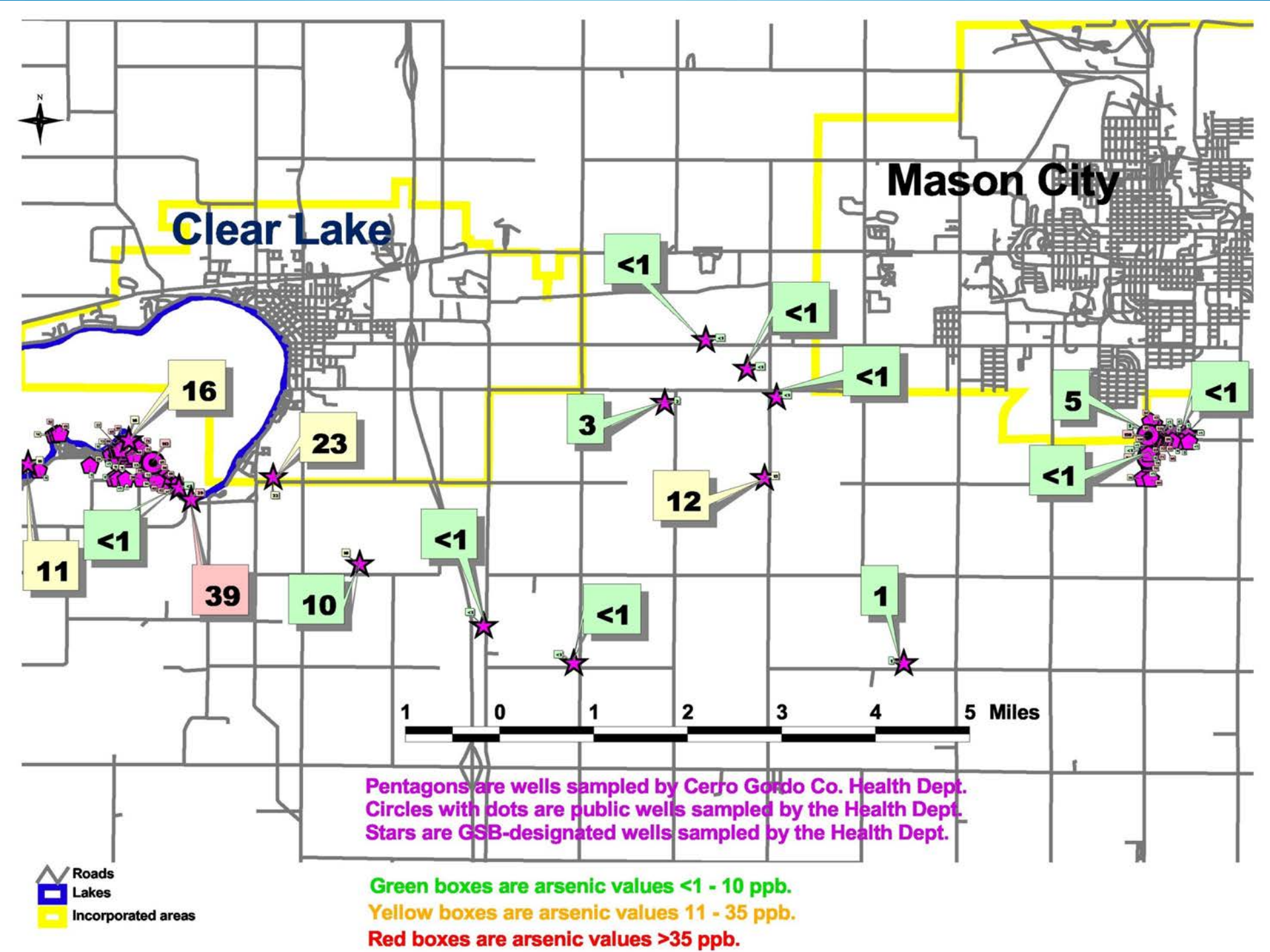
History—2003

- Cerro Gordo County Public Health approached by USGS to consider a dual partnership small scale study
  - Fiscal resources were not adequate to allow Cerro Gordo County Public Health to assist with this study
- However, other opportunities would soon come

History—2003—Cerro Gordo County Conducts Arsenic Study

- Funded by Iowa Department of Public Health
- Partnered with Paul VanDorpe
- Concluded to be naturally occurring and more likely to be completed or not cased through the Lime Creek formation
- Pyrite shales may be contributing arsenic



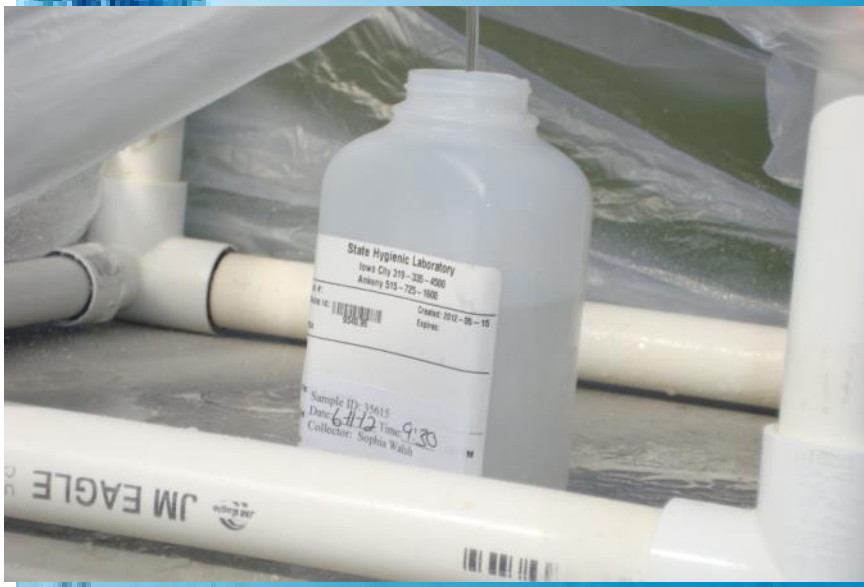

N
Clear Lake
Mason City
16
23
<1
<1
<1
3
12
<1
5
<1
<1
11
<1
39
10
<1
<1
1
1 0 1 2 3 4 5 Miles
Pentagons are wells sampled by Cerro Gordo Co. Health Dept.
Circles with dots are public wells sampled by the Health Dept.
Stars are GSB-designated wells sampled by the Health Dept.
Roads
Lakes
Incorporated areas
Green boxes are arsenic values <1 - 10 ppb.
Yellow boxes are arsenic values 11 - 35 ppb.
Red boxes are arsenic values >35 ppb.

History—2004—Arsenic Exposure

- A Cerro Gordo County woman living on the South Shore of Clear Lake develops shaking and neurological problems and goes to her doctor.
- Although Arsenic is not initially suspected, water samples are taken from the well and show levels above 10 ppb.

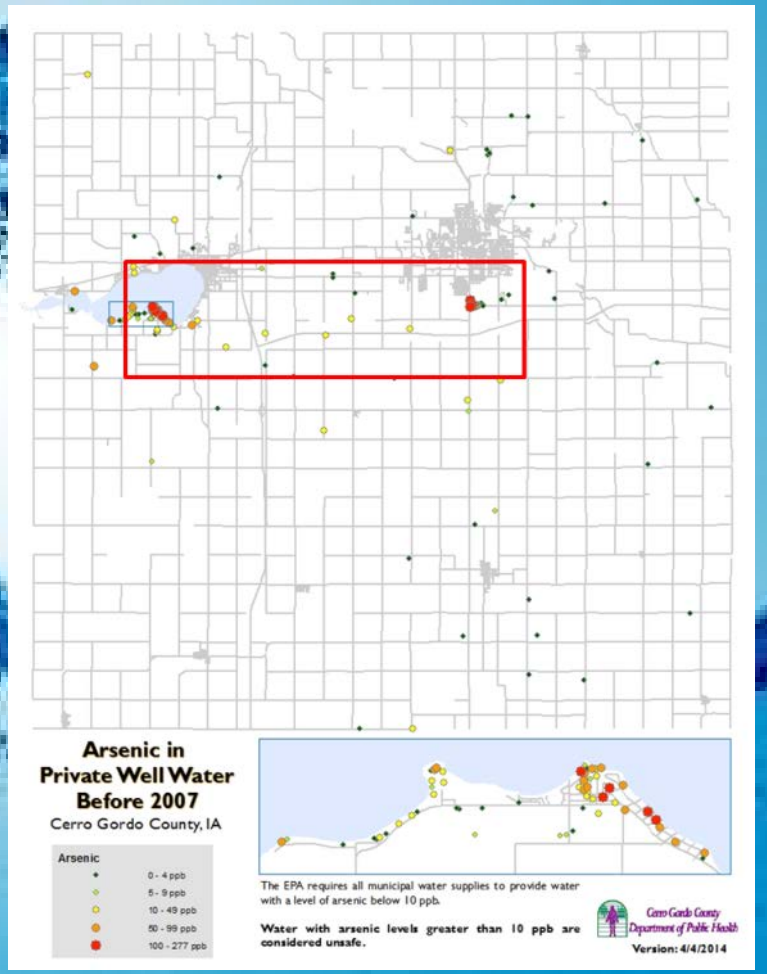
History—2004—Arsenic Exposure Cont.

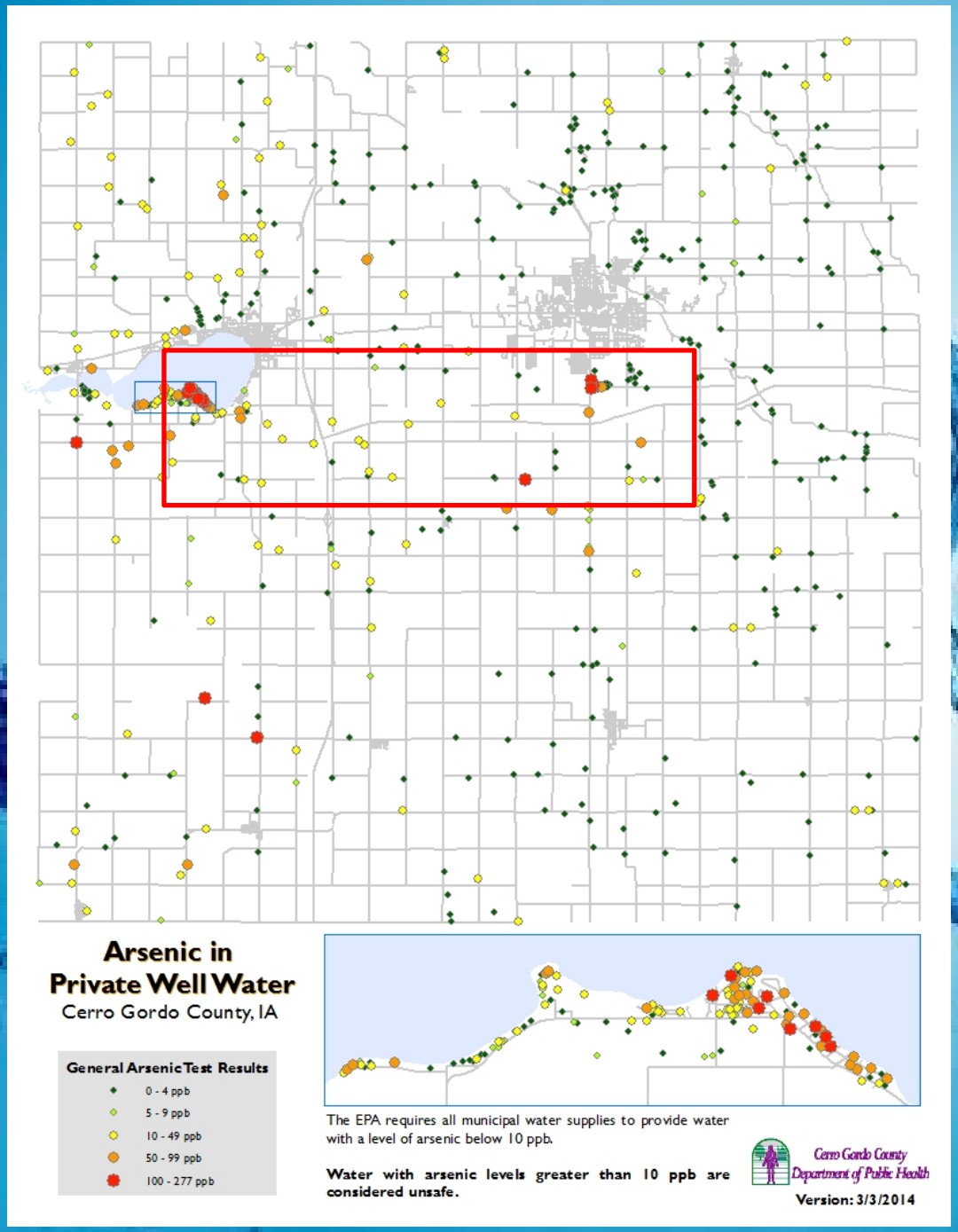
- The Department was contacted about the situation
- Neighbors notified and additional wells around Clear Lake are tested and
- Talk of follow up study, but no funding available



History—2007—Local Policy Change

- Arsenic Zone Established
- Policy change requiring all new wells in the county to be tested for arsenic



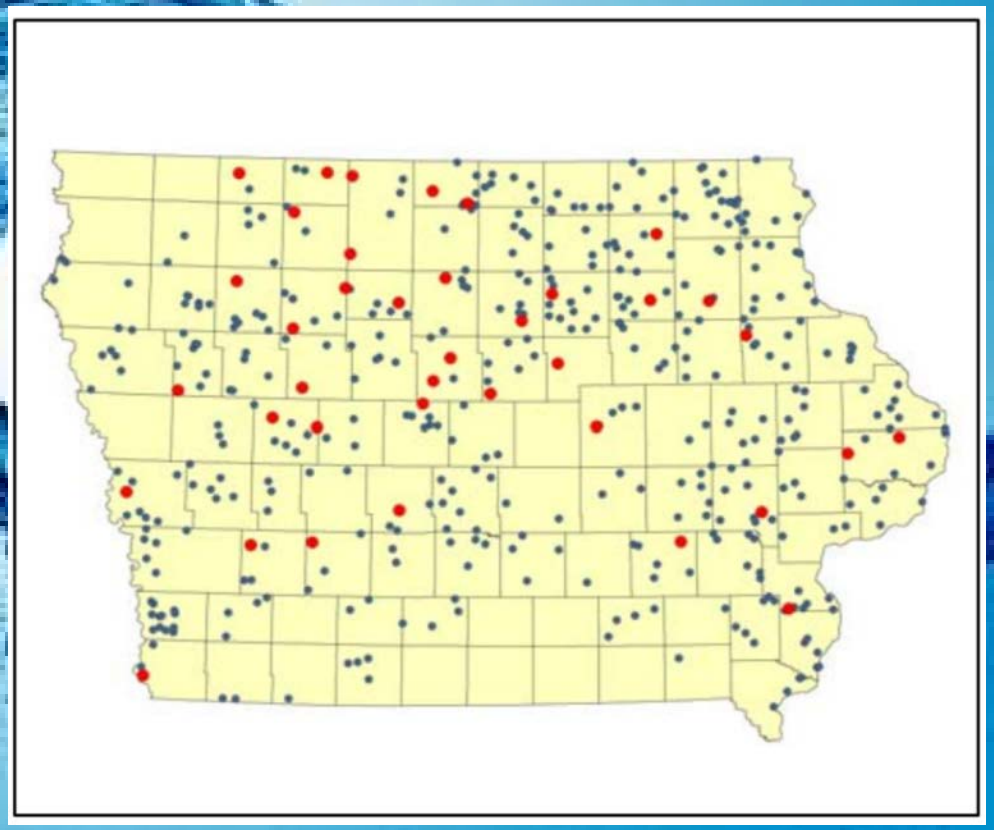


Cerro Gordo County Department of Public Health is updating our well ordinance to extend the arsenic zone to include the entire county

Based on the analysis by Dr. Doug Schnoebelen and Chad Fields, the well ordinance in Cerro Gordo County has been updated to require that all new wells are cased through the Lime Creek Formation and draw water from the Cedar Valley Group. These are the aquifers that most private wells draw water from in Cerro Gordo County. The ordinance will still require that all new wells be tested for arsenic. This will take effect on July 1, 2015.

History—2008 – SWRL2
Another Red Flag

- Half of wells tested showed detectable arsenic
- 31 counties in Iowa had wells with As levels Above 10 ppb



History—2009—Partners Collaborate

History—2009—Collaboration—Group develops hypothesis & looks for grant opportunities

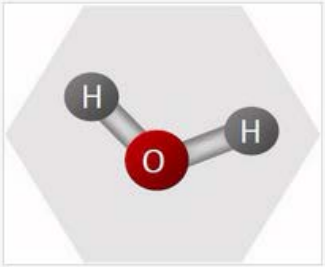
- Loreli Kurimski – SHL
  - had intern that had time to statistically analyze arsenic data
- Doug Schnoebelen – U of I
- Paul Van Dorpe
- Shawver Well Company

History of Arsenic Projects in Cerro Gordo County—2010

This grant allowed the Cerro Gordo County Department of Public Health to look into why there is arsenic in some groundwater in Cerro Gordo County and how to avoid it when drilling new wells.

Current Ground Water Grants

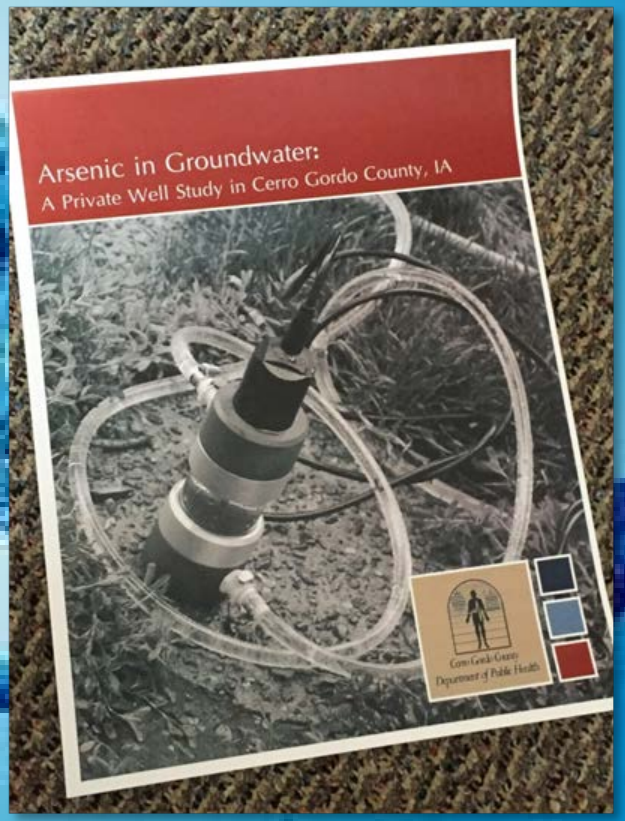
Did You Know?



In accordance with the Safe Drinking Water Act, municipal water suppliers must supply water with less than 10 parts per billion of arsenic to their water users.

It is the responsibility of the well owner or user to test their private well for contaminants. It is recommended that testing be done for bacteria, nitrates, and arsenic.

Arsenic has been found in groundwater throughout Iowa, many parts of the United States, and the world.



Lessons Learned

- Resident interested in arsenic speciation?? ($80.50—not covered by GTC)
    - For our CDC grant, which covers arsenic we take all four samples at the first visit. SHL will perform speciation test if above 5 ppb.
- Those who may not see the importance of testing for arsenic
    - "I've drank this water for years" (discuss prolonged exposure risk)
    - Grandchildren

Explanation of results

The results indicate arsenic levels **above** the United State Environmental Protection Agency (EPA) maximum contaminant level (MCL) of 0.010 mg/L (milligrams per liter) for public drinking water; there is no MCL from the EPA for private drinking water.

New Standard:

The old drinking water arsenic standard of 0.05 mg/L (50 ppb) from 1942 – 2005 in the U.S.

"It's important to recognize that the current drinking water standard of 10 micrograms per liter was never claimed to be a safe level," Smith (CDC) said. "It is a risk-management decision that was made by U.S. EPA under the Safe Drinking Water Act that takes into account the health effects but also the cost of mitigating [them]."

Communication to residents

May 12, 2015

[redacted]

Dear Ms. [redacted],

Enclosed are the results of the water analysis collected at the location listed above. The results indicate **unsafe** water due to high levels of arsenic. The results are at **safe** levels for total coliform bacteria and E.coli bacteria.

The results indicate arsenic levels **above** the United State Environmental Protection Agency (EPA) maximum contaminant level (MCL) of 0.010 mg/L (milligrams per liter) for public drinking water; there is no MCL from the EPA for private drinking water.

The results show the arsenic level at 0.026 mg/L. Arsenic in the water supply is only harmful if ingested.

A common option to remove arsenic from a private water supply is to install a two-step treatment process of chlorination followed by reverse osmosis. Contact a certified well contractor or pump installer for more information about treatment options.

For further information or if you have any questions, please do not hesitate to contact this office at (641) 421-9339.

Regards,

Jenna Willems, MPH, CHES
Environmental Health Specialist I

Enclosures

- IDPH Registered Water Treatment Systems for Arsenic Reduction List (Contact Randy Lane)

Common Questions

- Where does arsenic come from?
- Do I need to drill a new well?
- Who do I contact for water treatment?
- I have been drinking this water for many years, now what?
- Do I need to talk to my doctor?
- I give this water to my pets/livestock, do I need to treat their water?
- I use this water for irrigating my vegetable garden, can I still use this water for that?
- My water is 9 ppb, that seems really close to the MCL. Do I need to be concerned?
- How often should I test for arsenic?

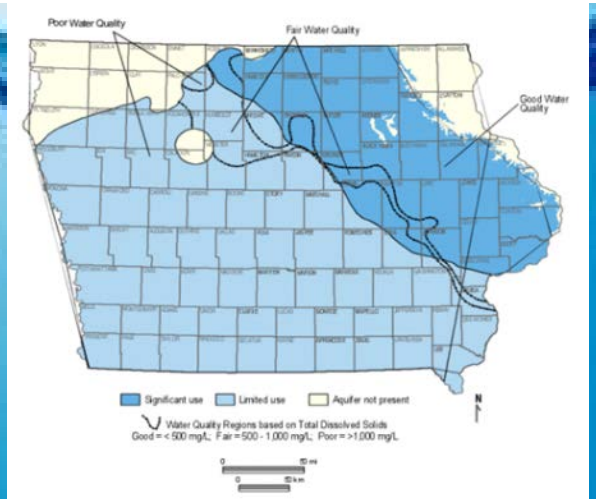
Less Common Questions

- Can we use water elevated in arsenic to brush our teeth?
- What tests can show if I have been exposed to arsenic?
  - There are tests to measure the level of arsenic in blood, urine, hair, or fingernails. A urine test is the most reliable to determine arsenic exposure that has happened within a few days. Tests on hair and finger nails can measure exposure to high levels of arsenic over the past 6-12 months.
- Questions about aquifers in your area

Specific information for our residents

- **Minor seasonal fluctuations in arsenic**
- **Newer (cased through Lime Creek) wells appear to be less prone to higher concentrations of arsenic than older wells.**
- **High arsenic can be found in groundwater of the Lime Creek and Cedar Valley. However, most prevalent in the Lime Creek due to oxidation reactions in the upper part of the aquifer.**
- **Rock chip samples show higher arsenic sources in the Lime Creek, typically associated with pyrite and shale.**

Iowa Geological Survey (2000) concludes arsenic is present in every major aquifer in Iowa



Less Common Questions

Units	[MPN]/100mL	Analyzed In	Coralville
Date Analyzed	2015-05-12 09:23	Date Verified	2015-05-13 10:20
Analyst	CAL, KFO	Verifier	CAL

Analyte	Result
Total Coliform Bacteria	<1
E.coli	<1

Note: If the total coliform bacteria and E.coli test results are "Absent" or "<1", these results are satisfactory and the water is bacterially safe for drinking purposes. If the total coliform bacteria test is "Present" or number is greater than or equal to 1 (e.g. 1, 20.7, 50.4, >200.5, etc), this result is UNSATISFACTORY and indicates the water is bacterially UNSAFE and should NOT be used for drinking unless properly disinfected before use (e.g. boiling for one minute). In addition, if the E.coli bacteria test result is also "Present" or number is greater than or equal to 1, this result indicates the water may be contaminated by human or animal sewage. E.coli presence indicates that the water may be contaminated with microorganisms that CAN cause disease and thus, represents a serious health concern. Contact your local county health department or SHL's web site (http://www.shl.uiowa.edu; click on Well Water in the left hand menu) for information and guidance to help correct your water quality problem.

Nitrate + Nitrite as NO3, EPA 353.2

Units	mg/L	Analyzed In	Coralville
Date Analyzed	2015-05-14 13:36	Date Verified	2015-05-15 11:39
Analyst	KFO, NH	Verifier	NH

Analyte	Result	Quant Limit
Nitrate + Nitrite as NO3	63	5

Note: If the nitrate concentration in this sample is less than or equal to 45 mg/L (as NO3), this level does NOT exceed the infant health advisory level. If the nitrate concentration in this sample is greater than 45 mg/L (as NO3), this level EXCEEDS the infant health advisory level and should NOT be used to prepare formula or used for drinking by infants less than six months of age. These levels pose a health risk to bottle-fed infants by reducing the oxygen-carrying capacity of the blood (rare disorder called methemoglobinemia). Contact your local county health department or SHL's web site (http://www.shl.uiowa.edu; click on Well Water in the left hand menu) for information and guidance to help correct your water quality problem. "Quant limit" refers to the lowest level the method can accurately detect.

- Quant limit difference for Nitrates

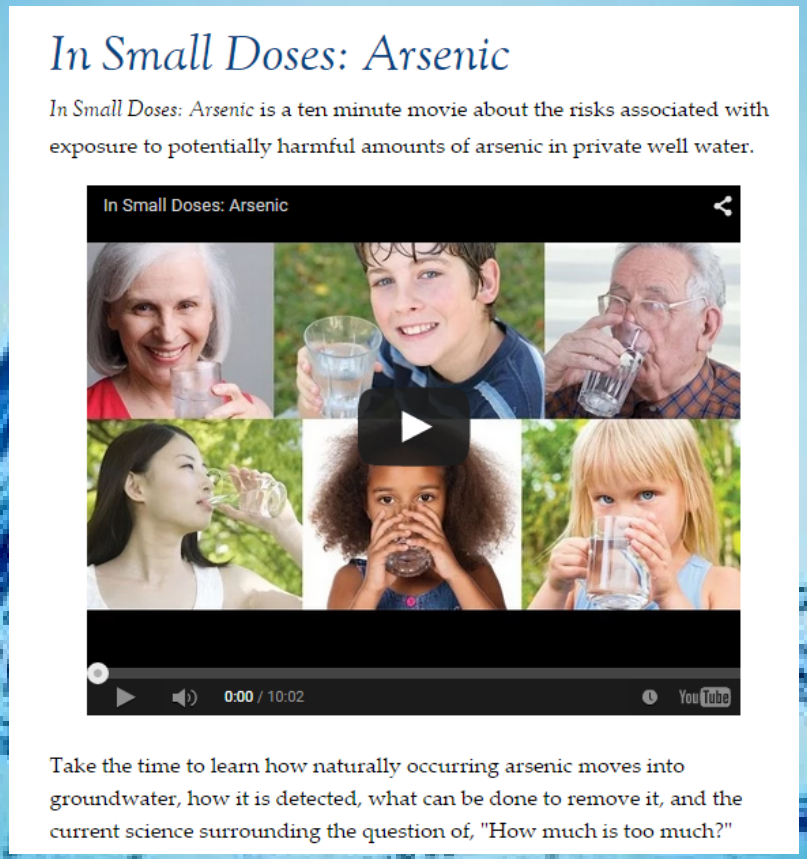
As with any contaminant/risk…

- It is difficult to pinpoint the exact concentration of arsenic in drinking water that can lead to a particular health problem. Individuals differ in their susceptibility to toxic effects. Most information about the toxic effects of arsenic comes from studying groups of people who consumed water containing naturally occurring arsenic over long periods of time. (MN State Dept. of health)

How to talk to residents

- Be up front and let them know about the possibility of arsenic issues when discussing bid for drilling or reconstruction.
- Here are some common responses:
  - Is arsenic really that bad?
  - Will this test affect a future sale of my home?
  - I am selling my house, I'm not interested in another test I'm not required to do.
  - I have been drinking this water for years, why should I test it now?
  - Do people who live around me have problems with arsenic?
  - If I an arsenic test comes back "unsafe" are you going to make me drill a new well?

“In Small Doses: Arsenic”



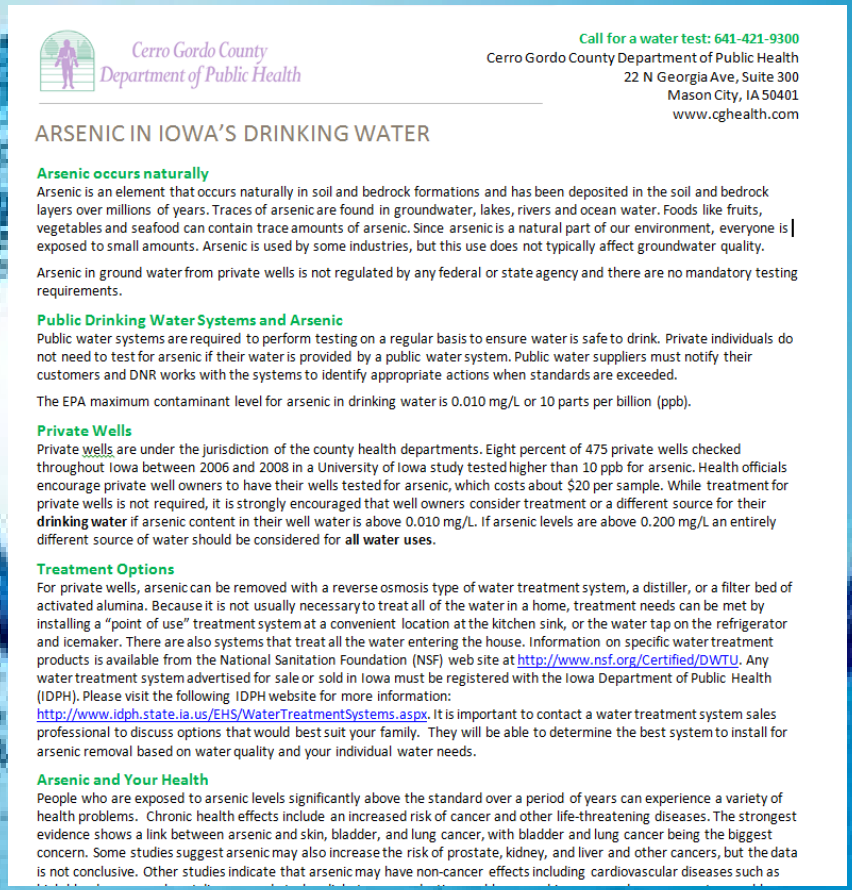
- http://www.dartmouth.edu/~toxmetal/InSmallDoses/

Obstacles & Challenges

- Gathering and maintaining volunteers
  - Sale of properties
- Weather
- Seasonal Homes
- Large amount of data to store and analyze

Marketing, Messaging, Resources for Residents

- Mailing Flyers
- Radio
- TV
- Social Media
- Well water folders



Cerro Gordo County Department of Public Health

Call for a water test: 641-421-9300
Cerro Gordo County Department of Public Health
22 N Georgia Ave, Suite 300
Mason City, IA 50401
www.cghealth.com

ARSENIC IN IOWA'S DRINKING WATER

Arsenic occurs naturally

Arsenic is an element that occurs naturally in soil and bedrock formations and has been deposited in the soil and bedrock layers over millions of years. Traces of arsenic are found in groundwater, lakes, rivers and ocean water. Foods like fruits, vegetables and seafood can contain trace amounts of arsenic. Since arsenic is a natural part of our environment, everyone is exposed to small amounts. Arsenic is used by some industries, but this use does not typically affect groundwater quality.

Arsenic in ground water from private wells is not regulated by any federal or state agency and there are no mandatory testing requirements.

Public Drinking Water Systems and Arsenic

Public water systems are required to perform testing on a regular basis to ensure water is safe to drink. Private individuals do not need to test for arsenic if their water is provided by a public water system. Public water suppliers must notify their customers and DNR works with the systems to identify appropriate actions when standards are exceeded.

The EPA maximum contaminant level for arsenic in drinking water is 0.010 mg/L or 10 parts per billion (ppb).

Private Wells

Private wells are under the jurisdiction of the county health departments. Eight percent of 475 private wells checked throughout Iowa between 2006 and 2008 in a University of Iowa study tested higher than 10 ppb for arsenic. Health officials encourage private well owners to have their wells tested for arsenic, which costs about $20 per sample. While treatment for private wells is not required, it is strongly encouraged that well owners consider treatment or a different source for their **drinking water** if arsenic content in their well water is above 0.010 mg/L. If arsenic levels are above 0.200 mg/L an entirely different source of water should be considered for **all water uses**.

Treatment Options

For private wells, arsenic can be removed with a reverse osmosis type of water treatment system, a distiller, or a filter bed of activated alumina. Because it is not usually necessary to treat all of the water in a home, treatment needs can be met by installing a "point of use" treatment system at a convenient location at the kitchen sink, or the water tap on the refrigerator and icemaker. There are also systems that treat all the water entering the house. Information on specific water treatment products is available from the National Sanitation Foundation (NSF) web site at http://www.nsf.org/Certified/DWTU. Any water treatment system advertised for sale or sold in Iowa must be registered with the Iowa Department of Public Health (IDPH). Please visit the following IDPH website for more information: http://www.idph.state.ia.us/EHS/WaterTreatmentSystems.aspx. It is important to contact a water treatment system sales professional to discuss options that would best suit your family. They will be able to determine the best system to install for arsenic removal based on water quality and your individual water needs.

Arsenic and Your Health

People who are exposed to arsenic levels significantly above the standard over a period of years can experience a variety of health problems. Chronic health effects include an increased risk of cancer and other life-threatening diseases. The strongest evidence shows a link between arsenic and skin, bladder, and lung cancer, with bladder and lung cancer being the biggest concern. Some studies suggest arsenic may also increase the risk of prostate, kidney, and liver and other cancers, but the data is not conclusive. Other studies indicate that arsenic may have non-cancer effects including cardiovascular diseases such as

Contact Information

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