

Many Streams, One River

Building Relationships and Coordinating Stakeholders
to Improve Water Quality in Cerro Gordo County, Iowa



We often take safe drinking water for granted. In many parts of the country, families drink private well water that looks and tastes clean but may in fact be contaminated with harmful substances like bacteria, nitrates, and arsenic. The good news is that with routine testing, treatment, and better access to alternative water sources, we can make sure everyone has safe, clean water to drink.

Cerro Gordo County in Iowa is one of many communities around the country that are tackling the issue of poor water quality in private wells. This case study is part of a ChangeLab Solutions series on how state and local public health agencies can move beyond programming and begin to address policy, system, and environment (PSE) changes to improve the quality of private well water. This case study illustrates the role a public health department can play in supporting PSE change and improving well water quality, describing some of the strengths of Cerro Gordo County's work:

- **Investing in relationships.** The success in Cerro Gordo County was in large part the result of time, energy, and resources spent at the beginning of the project. It is important to build into grant proposals and project timelines the resources and steps needed to identify a shared vision and develop trust among partners and with residents.
- **Excelling in coordination and communication.** Many public health departments fulfill an essential role by facilitating collaboration among many groups, including community partners. Dedicated staff for leading coalitions and coordinating cross-sector efforts to improve health can make all the difference, as seen in Cerro Gordo County.

To learn more about what other communities are doing to tackle water quality issues, visit changelabsolutions.org/publications/closing-water-quality-gap.

Introduction

For 25 years, Sandy Davis drank water from a private well on her property in Cerro Gordo County, Iowa.¹ She believed her water was safe; it didn't have a funny odor or taste.² She drank 8 glasses a day – for her health, she thought. What she didn't know was that her water was contaminated with dangerous levels of arsenic. Over the years, arsenic gradually began to accumulate in her body. She developed tremors in her hands. Once Davis and her husband figured out the source of her ailment, they pooled funds with neighbors to drill a new well that was free of arsenic. But it was too late to reverse the damage from the long, slow poisoning. Sandy's hands still tremble; her joints ache; and she's experienced some balance problems that may also be related to her long-term arsenic exposure.

"Arsenic in water is a big deal in this area. It's just a reality, and you should know whether your well has it or not," Davis said. The Davises now test their water every year.

But many other Iowa families may still be exposed to arsenic in their private well water. Arsenic is present in all major aquifers in Iowa, where approximately 288,000 people drink water from 105,000 active private wells.³ Private wells are not regulated by the federal Safe Drinking Water Act, and Iowa state law has no requirements for testing existing wells for arsenic.

To ensure safe drinking water for residents in Cerro Gordo County, a group of local and state organizations came together to address the arsenic issue. The group included partners from the Cerro Gordo County Department of Public Health, the Iowa Department of Natural Resources, the State Hygienic Laboratory, Shawver Well Company, Hydrosience & Engineering at the University of Iowa (IHHR), the Center for Health Effects of Environmental Contamination, and the Iowa Geological Survey. From 2010 to 2015, this coalition of water safety experts and advocates studied arsenic contamination in private wells through a grant from the Centers for Disease Control and Prevention (CDC). The partners then used their study results to strengthen a local water quality ordinance, which helped influence the revision of Iowa's Grants to Counties Water Well Program.

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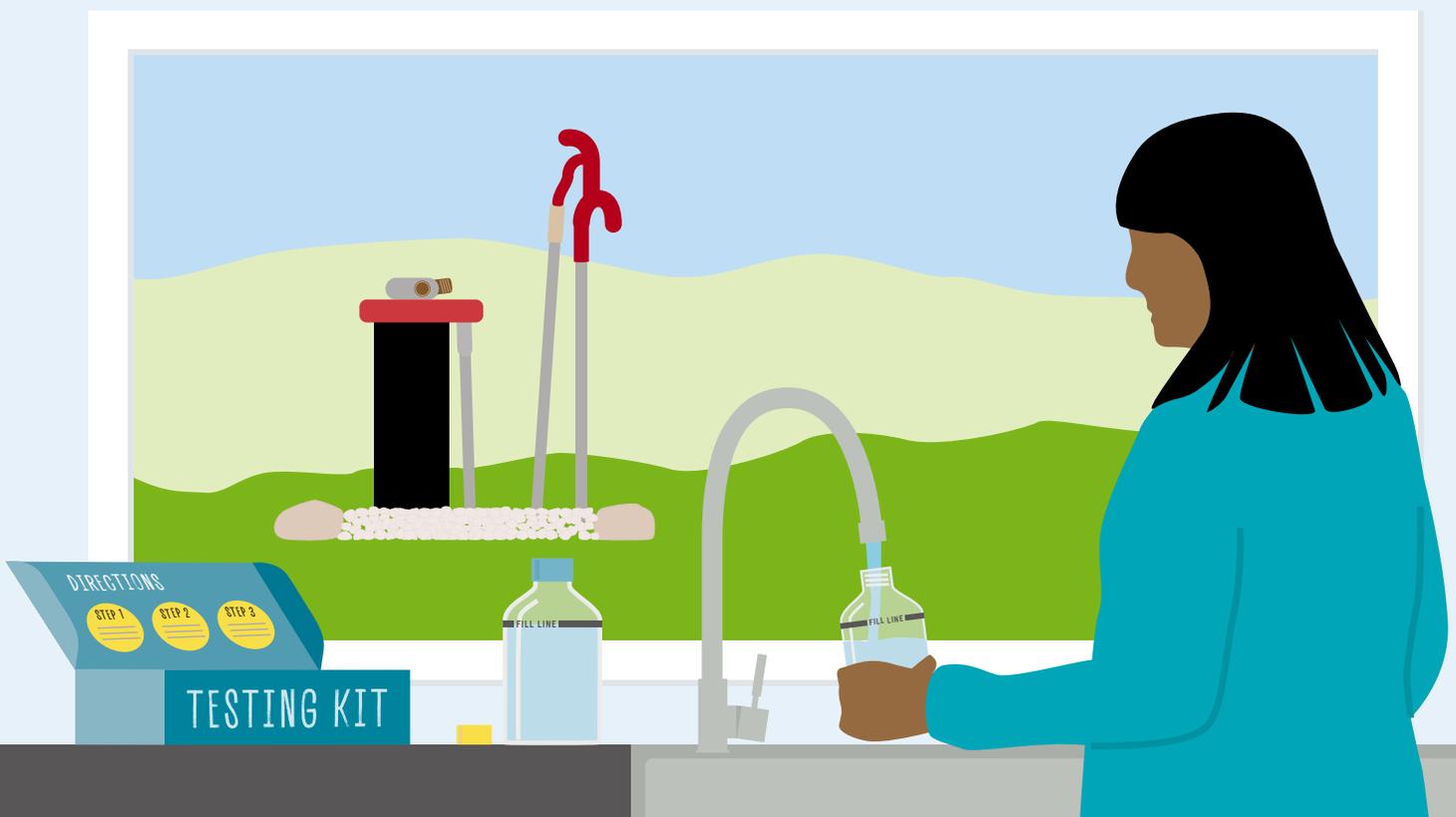
The Problem

The Cerro Gordo County Department of Public Health (DPH) knew that arsenic in private well water was a problem for their residents. The Iowa Statewide Rural Well Water Survey Phase 2 (SWRL2) found arsenic in nearly half of the private rural wells sampled from 2006 to 2008.⁴ In addition, 8% of wells testing positive for arsenic were identified as not safe to drink from, with arsenic levels exceeding the US Environmental Protection Agency (EPA) standard of 10 micrograms of arsenic per liter.⁵ High concentrations of arsenic were most prevalent in Iowa's north central region, with nearly 1 in 5 water samples from wells in and around Cerro Gordo County flagged as not safe to drink from.

Arsenic occurs naturally in groundwater from some wells. Drinking water with unsafe levels of arsenic can have both acute and long-term health effects, including nausea, vomiting, skin lesions, and neurological or circulatory problems. Drinking arsenic-contaminated water over a long period increases the risk for some types of cancer.⁶ Arsenic doesn't affect water's smell, taste, or color, even in high concentrations, so testing is the only way to know how much arsenic is in the water. Once their well is tested, homeowners can address the problem of arsenic contamination in their well water by installing the proper water treatment system.⁷

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Prior to 2007, state regulations for private wells required testing of all new or modified private wells upon final inspection – but only for nitrates and bacteria.⁸ In 2007, Cerro Gordo County's Nonpublic Water Supply Wells ordinance expanded this testing requirement to include arsenic and identified a specific arsenic zone with known contamination, within which new and modified wells were subject to stricter well drilling and construction standards.⁹ However, this still left two significant regulatory gaps:

1. While the 2007 ordinance identified a specific arsenic zone with known contamination, within which new and reconstructed wells were required to comply with stricter drilling and construction standards, that zone only covered one corridor of the 56-square-mile county, leaving the remainder of the county, which could still have unsafe levels of arsenic contamination, subject to the less restrictive drilling and construction requirements.
2. While new and modified wells were required to be tested, this still meant that there were a large number of existing unmodified wells in Cerro Gordo County that had not been tested for arsenic contamination and were still actively being used.

Given the regulatory gaps, it was possible that many of the 6,568 residents in Cerro Gordo County served by private wells could have been exposed to harmful levels of arsenic without knowing it, particularly if their well was neither new nor recently modified or if they resided outside of the designated arsenic zone.

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The Project

With CDC funding, Cerro Gordo County DPH and its partners set out to study arsenic in groundwater and identify ways to either prevent contamination or minimize consumption of unsafe drinking water.

The first step was testing. After an extensive community outreach effort, the owners of more than half of the wells eligible for the study gave the project team permission to test their well water. (Another 10 wells were added to the project in the third year, based on referrals from a local well-drilling company.) The study wells were to be tested not just once, but twice a year over 3 years, which would help the team investigate whether local arsenic levels fluctuated according to seasonal or multi-year rainfall or drought conditions, as happens in some places.¹⁰

Brian Hanft of Cerro Gordo County DPH said this high response rate was an indication of DPH's credibility in the community and identified this credibility as an asset that health departments can offer local partnerships. "People know us. We had direct access to a population that generally trusts us," he said. To encourage participation, the project also gave well owners involved in the study a small stipend: a gift certificate that could be redeemed at any business that belonged to the Mason City Chamber of Commerce.

Cerro Gordo County DPH worked with their team of partners and residents to develop a process that increased efficiency and responded to well owners' experience.

THE WELL-TESTING PROCESS



For each semiannual test, Cerro Gordo County DPH visited each participating well owner's property and collected 2 water samples.



Cerro Gordo County DPH then sent the samples to the State Hygienic Laboratory for testing. The laboratory used the first sample to determine the total concentration of arsenic and other metals in the water. If the first sample had arsenic, they used the second sample to determine the specific form of arsenic present. (This helped minimize the disruption to a well owner that a resampling visit could create.)



Once DPH received the test results, they contacted well owners right away to discuss treatment options, if needed.

The water test results and on-site conditions were matched with each well's rock chip samples and well log, which are collected at the time of drilling. The well logs in the Iowa Department of Natural Resources' database catalog each well's geology, depth of slate layer, and depth of the aquifer. The rock chips that the tests were cross-referenced to were either housed at the Iowa Geological Survey or, for new wells, provided by Shawver Well Company. Cerro Gordo County DPH and IIHR confirmed the wells' locations using historical well information, GIS (geographic information systems) mapping, and site visits.

When combined, these data sources created a more complete picture of arsenic contamination in Cerro Gordo County's private wells. As a result, DPH found that arsenic is more likely to contaminate wells that draw water from the Lime Creek aquifer rather than the Cedar Valley aquifer. The Lime Creek aquifer has more naturally occurring arsenic in the rock, along with geochemical conditions that favor the release of that arsenic into groundwater.

The Lime Creek aquifer sits above the Cedar Valley aquifer, so the project group recommended that drillers and homeowners take two steps to ensure safer drinking water. The first recommendation was to avoid drilling wells that tap the Lime Creek aquifer and instead drill further down, tapping new wells at least 10 feet into the Cedar Valley aquifer to access uncontaminated water. The second recommendation was to encase all new wells to prevent arsenic from the Lime Creek aquifer from contaminating drinking water as it makes its way to the surface.

The study also showed that arsenic levels in Cerro Gordo County are relatively stable over wet and dry seasons and years. Based on this stability, the group recommended testing well water for arsenic every 3 to 5 years – or annually, if the first test shows arsenic at a concentration close to the EPA drinking water limit of 10 micrograms per liter.

The recommendations for arsenic testing were incorporated into the partners' public communications, with a big push for water testing during National Groundwater Awareness Week. Postcards were sent to residents, for example, and announcements aired on radio, television, and social media. One video features Jack and Sandy Davis, the Clear Lake couple who knows firsthand the damage that long-term arsenic exposure can cause.

As of September 2015, toward the end of the project period, the State Hygienic Laboratory had tested 150 samples from Cerro Gordo County for arsenic, in addition to those included in the study.

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Brian Hanft,
Cerro Gordo County DPH

Policy Changes & Impact

The Cerro Gordo County project not only increased public awareness of well water quality issues but also strengthened county and state policies and improved local industry practices.

County Well Ordinance

The Cerro Gordo County Board of Supervisors amended the county's well ordinance in 2015 to apply many of the project partners' recommendations countywide. Representatives of Shawver Well Company, a drilling business and project partner, came to the hearing to express support for the changes and provide an industry perspective. The ordinance now requires arsenic testing for all new and reconstructed wells within the first 30 days of use, and all new wells in the county have to be drilled and cased through the Lime Creek aquifer and into the Cedar Valley aquifer.¹¹ Prior to the study, the drilling and casing regulations applied only to a more limited arsenic zone. These amendments also helped close the second regulatory gap by expanding testing to include arsenic in addition to nitrates and bacteria.

Rules for Iowa's Grants to Counties Water Well Program

Iowa's Grants to Counties Water Well Program offsets the costs of water testing for small private well systems. Before 2015, the program allocated the same amount of money each year to every eligible county but didn't allow for moving funds between counties based on geographic or population needs. These funds could be used for plugging or reconstructing wells or for testing well water for nitrates and bacteria – but not for arsenic.¹²

To raise local awareness about water quality issues, Cerro Gordo County DPH made presentations to local civic groups and professional associations. The presentations also helped these groups see the need for state action to improve their water quality, and local residents and civic leaders in turn petitioned state legislators to address arsenic contamination of small water systems. As a result, in 2015, the Iowa Department of Public Health made 2 revisions to the rules for the state's Grants to Counties Water Well Program:¹³

1. Unspent funds can now move between counties so that funding from counties with lower well water needs can be moved to counties with higher needs.¹⁴
2. Well owners can now ask county health departments to test their water for arsenic.¹⁵

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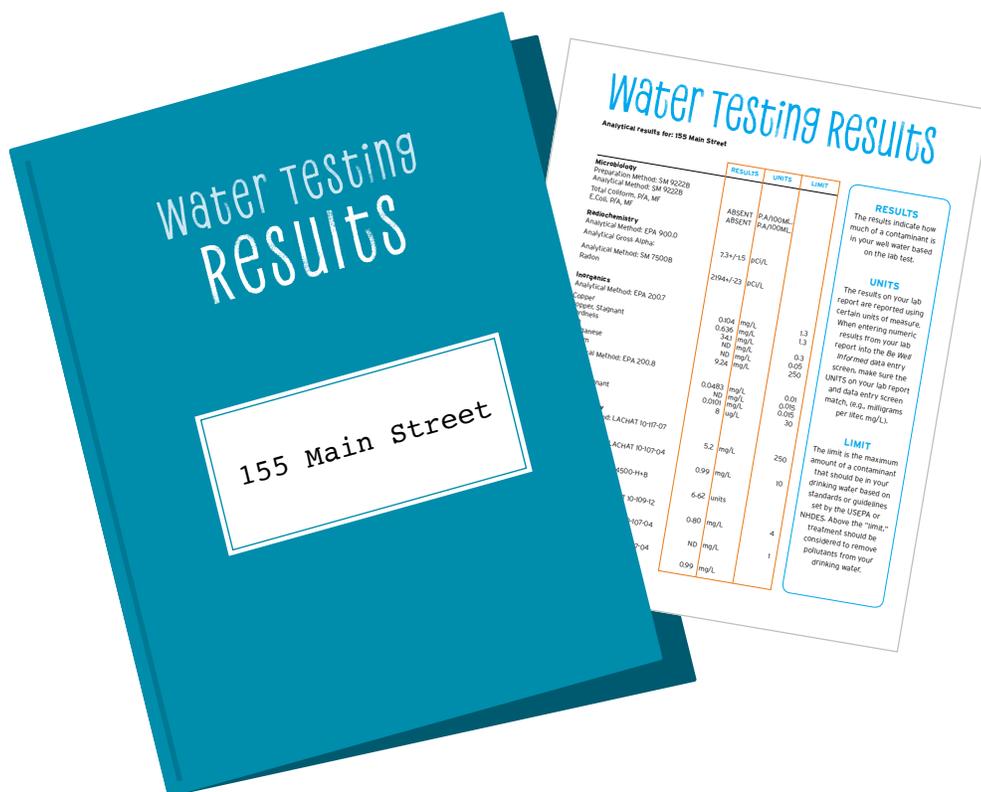
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“The Grants to Counties program really changed because of this project, because of all the partners coming together,” said Sophia Walsh, Cerro Gordo County environmental health specialist II. These changes directly benefit Cerro Gordo County residents by reducing barriers to arsenic testing of water from existing wells. Because of Cerro Gordo’s unique geographic needs and the outreach efforts of Cerro Gordo County DPH, the county has a greater demand for well water testing and spends all of its Grants to Counties program funds every year. The 2015 rule changes give Cerro Gordo County access to additional funds, which it can now use to provide arsenic tests at no cost to well owners.

Local Industry Practices

The project also affected local industry practices in well drilling and real estate. For example, Shawver Well Company collects rock chip samples from new wells. As a result of its participation in this project and the relationships formed, Shawver started educating well owners about arsenic in drinking water.

Increased funding and public awareness has also helped make well water testing a more routine part of real estate transactions. “To avoid any issues at the time of closing, realtors call me right away when they list a house,” said Cerro Gordo County’s Sophia Walsh. “Now that the arsenic testing is free [through the Grants to Counties program], they’re much more likely to do it. And now a lot of people are asking for it; a lot of buyers are asking for it.”



Conditions for Success

Cerro Gordo County's work on well water quality shows how changes in the environment, systems, and policies can all work together as part of a comprehensive strategy to tackle a multifaceted problem. The partners in Cerro Gordo County identified several aspects of this project that helped it succeed, including preparation, partnerships, coordination, and community outreach.

Preparation

Before they decided to apply for funding together, the partners in Cerro Gordo County met regularly for a full year to develop trust and agree on how to approach the problem and what they hoped to accomplish.

Taking time to build familiarity and rapport among partners before embarking on the work is essential. Even though the partners knew of one another through professional networks, it was Janel Hartwigsen, a graduate intern from Des Moines University, who convened the group in 2008. Hartwigsen brought partners together based on the initial SWRL2 study results, as part of her capstone project with the State Hygienic Laboratory.

"These kinds of things need a catalyst," said Pam Mollenhauer of the State Hygienic Laboratory. "Sometimes we all get [so] caught up in our day-to-day work that we don't have time to reach out and develop that network.... Relationship building is key. You've got to be doing that to be able to collaborate."

When this funding opportunity became available through the CDC's Environmental Health Specialists Network, "the ice had been broken," said Cerro Gordo County DPH's Brian Hanft. "We were already very aware of who we all were. Our office wrote the grant application with complete input from the rest of the group," Hanft said.

Partnerships

The partners identified several ways that working together strengthened their effort to create safe drinking water in Cerro Gordo County. "All of us brought a different set of assets and cooperated. Everybody came together, offering resources to make the project work, to stretch those dollars as far as we possibly could," said Mollenhauer. "Having a great network of folks working together is key to the project. It takes a network to do policymaking in our state."

The group was more effective because people from different organizations and systems were able to address the issue from different

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State Hygienic
Laboratory

angles. These partners relied on one another's expertise to make sense of the data and ensure that the group's conclusions were correct. "We collaborated and asked for help because we knew we didn't have the capacity to do it on our own. We needed others to help with the problem," said Sophia Walsh. Furthermore, because they represented various disciplines, the partners could tailor messages about safe drinking water to their audience, whether that was policymakers, academics, or the general public. The fact that the issue of arsenic contamination had attracted such a broad range of partners lent credibility to their cause.

Coordination

The project also benefited from dedicated staffing. The grant enabled Cerro Gordo DPH to hire Sophia Walsh to coordinate all aspects of this project over a five-year span. Walsh facilitated regular conference calls for partners and an annual in-person meeting. She resolved issues and answered questions from coalition members and project participants to keep the project moving forward.

"The day-to-day tracking, reporting, documentation, fieldwork, water collection, the learning of the processes and the procedures – she was it," Hanft said. Walsh learned how to calibrate and use all the field devices. She collected all the water samples. Her familiarity with all aspects of the study allowed her to serve as the main point of contact for partners, residents, and volunteers – the one person who connected all stakeholders to the project and to one another.

Community Outreach

The project mounted an impressive public awareness campaign to inform residents about the possibility of arsenic in local wells and to recruit participants for the study. Messages on the importance of safe drinking water were disseminated through newspaper, radio, television ads, billboards, mailings, social media, and the DPH website. The project group made a point of sharing information widely, to make sure people knew what the group was doing, whether they participated in the study or not.

"We met with all the local elected officials, including our supervisors and all the city councils. We went to the local towns to let them know what was going on in our community. We were everywhere, so people knew what was coming," said Walsh. "Most of the folks that we got to test [their] water were because of mailings and by word of mouth."

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Cerro Gordo DPH

Next Steps

In addition to continuing their efforts to educate the public on how to ensure safe drinking water, the partners in Cerro Gordo County hope to develop a predictive model for arsenic contamination that could power an online tool. Well drillers and homeowners could, for example, click on an online map and find out the likely safe depth for a well at that location and the estimated cost of drilling it.

The partners would also like to study the health effects of long-term low-level arsenic exposure and identify resources for water treatment. The group wants to better understand how other trace metals in well water interact with arsenic and to investigate nonresidential public water supplies—for example, those at campgrounds and some rural businesses.

Since their partnership was so successful, the project team has considered brokering relationships between public health schools and journalism schools at nearby universities. Students could learn public health reporting or media advocacy, and they would all practice framing research in a way that is compelling for a lay audience and has the potential to shape policies.



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Notes

1. Eller, D. Danger lurks in Iowa's water, testing shows. *Des Moines Register*, August 26, 2016 (updated August 27, 2016). www.desmoinesregister.com/story/news/2016/08/26/testing-shows-danger-iowas-private-wells/88755480 and www.newspapers.com/newspage/218561057.
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3. Data from the "Iowa Infrastructure 2015 Report Card," American Society of Civil Engineers and Iowa Department of Natural Resources; see shl.uiowa.edu/env/privatewell/lowabynumbers.pdf.
4. Center for Health Effects of Environmental Contamination, University of Iowa (2009 August). Iowa Statewide Rural Well Water Survey Phase 2 (SWRL2): Results and Analysis. cheec.uiowa.edu/sites/cheec.uiowa.edu/files/field/research/SWRL2%20results.pdf.
5. Center for Health Effects of Environmental Contamination, University of Iowa, Iowa Statewide Rural Well Water Survey Phase 2 (SWRL2) Fact sheet available at: cheec.uiowa.edu/research/archive.
6. Chemical Contaminant Rules. U.S. Environmental Protection Agency website. www.epa.gov/dwreginfo/chemical-contaminant-rules.
7. Each owner should consult with a well treatment expert before choosing to install a well treatment system. There are a number of treatment options, each with its own advantages and disadvantages. For more information see: Well Treatment: Treatment of Well Water. Centers for Disease Control and Prevention website: www.cdc.gov/healthywater/drinking/private/wells/treatment.html.
8. Iowa Admin. Code 567-ch. 38 (Private Well Water Construction Permits); see also Iowa Admin. Code 567-ch. 49 (Nonpublic water supply wells).
9. Cerro Gordo, Iowa County Ordinance #28A. Sections 2.21, available at: cghealth.com/images/Well_Ordinance_January12007.pdf.
10. Arsenic concentration can vary between wet and dry seasons in some areas of the country, which can necessitate that regulations specify when well testing should occur (see Thundiyil JG, Yuan Y, Smith AH, Steinmaus, C. Seasonal variation of arsenic concentration in wells in Nevada. *Environ Res* 2007 Jul; 104(3):367-373. Abstract available at: www.cdc.gov/niosh/nioshtic-2/20037247.html).
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12. Iowa Code Ann. § 455E.11. 2.b.(3)(b); Iowa Code Ann. § 135.11(26). See Iowa Admin. Code 6641-ch. 24 (Private Well Testing, Reconstruction, and Plugging—Grants to Counties).
13. Iowa Code Ann. § 455E.11. In 2016, the legislature amended portions of the section not related to water testing. 2016 Ia. Legis. Serv. S.F. 2181.
14. Iowa Admin. Code 641-24.4(2)(135).
15. Revisions to Chapter 24 Effective July 1, 2015. Iowa Department of Public Health website: idph.iowa.gov/Portals/1/Files/EHS/chapter_24_updates.pdf.