

Building a Database by Developing Relationships

Comprehensive Private Well Data in New Mexico



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.

The New Mexico Department of Health (DOH) is one of many agencies around the country tackling the issue of poor water quality. 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 critical role a public health department can play in building a more effective well data system, enabling DOH to diagnose and investigate environmental public health problems and health hazards in New Mexico communities. This case study describes DOH's work:

- **Developing a statewide well database.** DOH built a comprehensive database from scratch, working to collect and consolidate as much information on private wells as possible. DOH had identified a crucial need for more complete well data not only to guide its programmatic work but also to inform broader PSE change.
- **Fostering communication and cooperation between agencies and levels of government.** DOH's data-gathering effort was underpinned by a networking and relationship-building process. This project has improved data-sharing practices and feedback between agencies and established lines of communication that are likely to bolster future interagency collaboration.

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

Introduction

About 20% of New Mexicans – roughly 400,000 people – draw their drinking water from private wells, which are not subject to any testing, monitoring, or water quality requirements under state or federal law.¹ If these private wells become contaminated with, for example, harmful bacteria or high levels of arsenic or nitrates, they can pose public health risks. Agencies, including the New Mexico Department of Health (DOH), respond to these outbreaks, but their ability to respond is hampered by a lack of accessible data. Historically, no state agency developed or maintained a statewide database or registry for public wells, which meant that there was no single comprehensive data source for DOH or other agencies to rely on to assess the risk of chemical contaminant exposure for certain locations or respond to waterborne bacterial outbreaks.

To address this gap in capacity, with support from a Centers for Disease Control and Prevention grant, DOH's Epidemiology and Response Division undertook a multi-year effort to gather and collate available data about the state's private wells. In addition to helping DOH assess and analyze health risks from private wells, this effort also fostered better working relationships between agencies and identified opportunities for policy changes that could improve the collection, analysis, and use of well data in the future.

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The Problem

New Mexico is a mountainous and high desert state, subject to a long-running drought and the increasing effects of climate change.² The state draws most of its water resources from groundwater stored in subsurface aquifers, a resource declared by law to be publicly owned, with water access rights strictly regulated.³ Roughly 20% of the state's 2 million residents get their drinking water from private wells that tap these underground aquifers.⁴

Private wells are significant not only for their impact on groundwater supplies but also for their potential public health ramifications.⁵ Well water can serve as a reservoir for bacterial contamination, resulting in outbreaks, or for chemical contaminants from environmental sources, such as nitrates or arsenic. For example, arsenic is widely distributed throughout rocks, soil, and groundwater aquifers in New Mexico, and drinking private well water with a high concentration of arsenic over a prolonged period can cause serious health problems.⁶ Agencies like the New Mexico Department of Health are tasked with responding to public health emergencies and reducing health risks from environmental contaminants, including from private well water. But the private wells themselves are not subject to any water quality requirements under federal law or New Mexico state law. There are legal standards for well drilling, construction, and repair⁷ but no additional inspection, monitoring, or water testing requirements after a well has been drilled.⁸

Despite issues of water scarcity in the state, the relatively high percentage of people who depend on private wells, and the risks associated with unregulated water sources, New Mexico has never maintained a comprehensive database of private wells. To the extent that information on private wells in New Mexico is collected at all, the data are collected separately by different public agencies and private entities, for different purposes and in different formats. As DOH Environmental Health Epidemiology Bureau Chief Heidi Krapfl put it, "There's not this one, beautifully clean database with all the wells just magically lined up."

This lack of private well data has limited the capacity of DOH and other agencies to respond to outbreaks, assess risks for exposure to contaminants, and otherwise guide the allocation of public health resources. As DOH Epidemiologist Barbara Toth said, "We would like to be able to assign exposure to people who live in certain areas... so we can make connections between health effects in New Mexico communities and their exposure, and... teach them how they can prevent this exposure or treat their water. Because that's our goal: to empower people so they can control their excessive exposures, to prevent... adverse health effects."

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Barbara Toth,
DOH epidemiologist

The Project

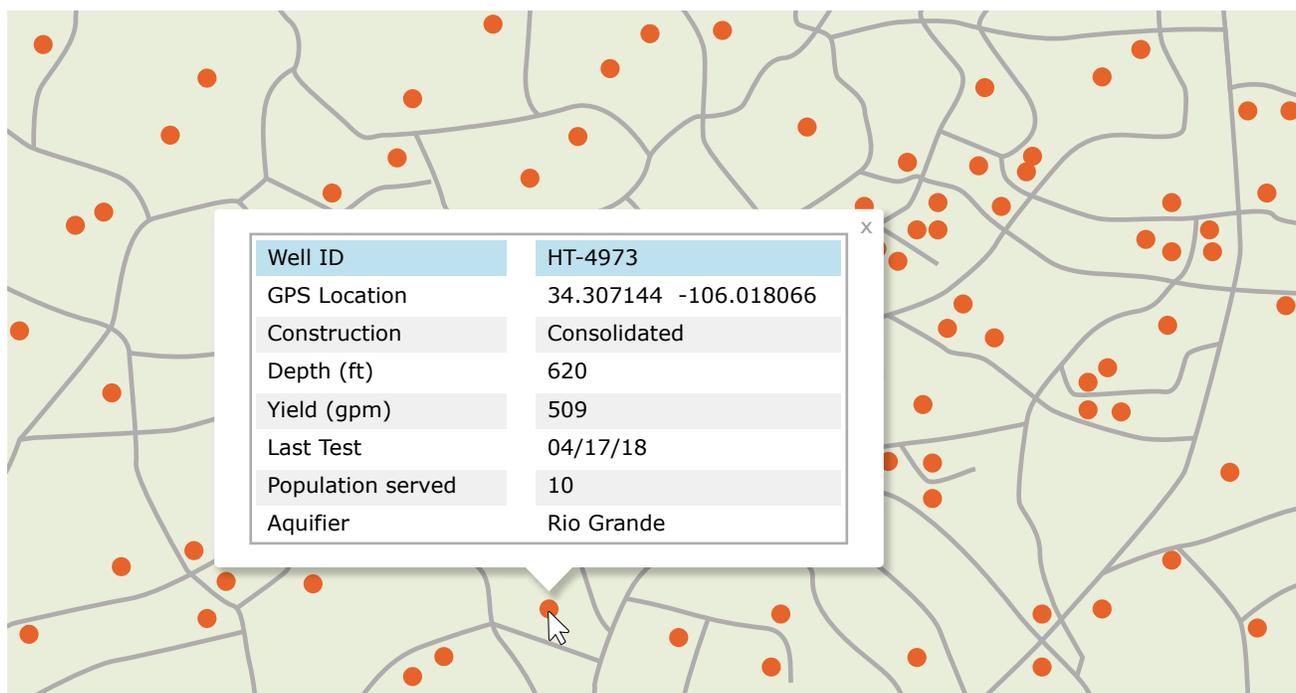
Understanding the importance of having robust data to guide their public health programs, in the early 2010s, DOH began a project to collect as much of the available private well information as it could into a single comprehensive database. Several fundamental questions surfaced in the early days of the effort.

Which Data Are We Looking For?

First, DOH staff needed to determine what kinds of data about private wells would be most helpful in assessing health risks or responding to public health emergencies. Some useful variables were obvious: a unique identifier for every well, which helps link all of the data collected about that well regardless of agency, and well location at the greatest level of detail possible. These data would allow georeferencing of a well location and subsequent assignment of the well to a census tract, for example, whereas a street address is often not granular enough to be helpful in assessing exposure risk from a well's water, especially for larger properties or properties with multiple wells. Information about the aquifer that supplies a given well is also important, because the source of the water affects a well's risk of contamination.

Beyond basic information about each well's location and source aquifer(s), DOH also hoped to gather as much information as possible about each well's construction (eg, depth, materials, seal), testing history (if any), and population served, which might include more than one household. All of these variables could help DOH assess and respond to health risks from well water.

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Where Can We Find the Data?

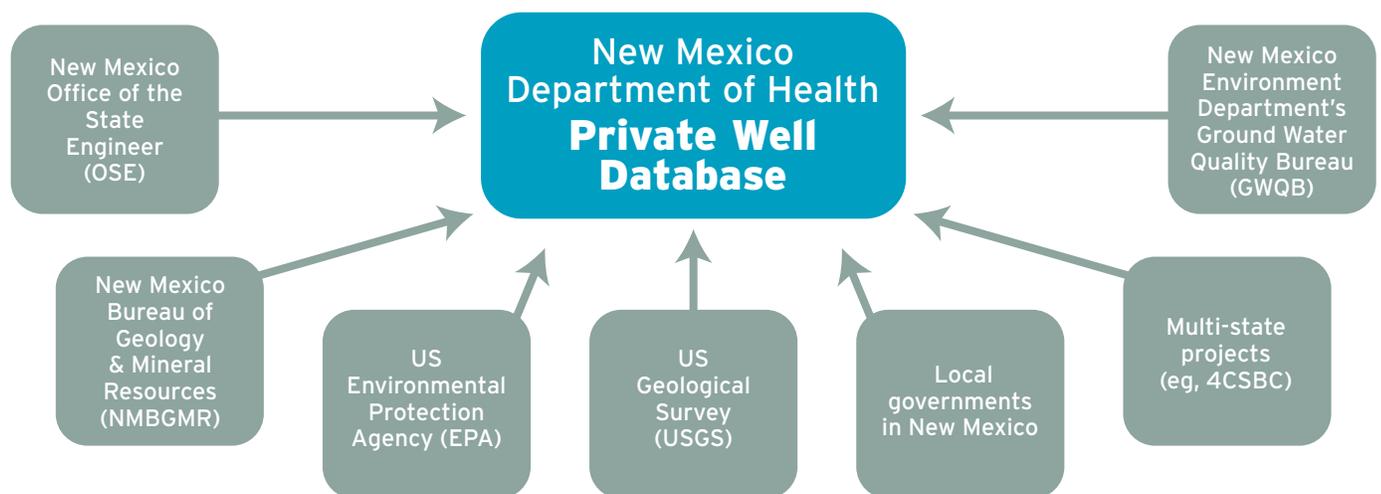
DOH didn't have the resources to mount a statewide survey of all private wells, so the aim of the project from the beginning was to find and compile *existing* data. Consequently, what began as a data collection effort became, in many ways, a networking project. DOH needed to survey the landscape of agencies that worked with private wells in some capacity, then build relationships with those agencies in order to access their data. Over the course of their data-gathering work, DOH staff found data on private wells from sources both expected and surprising, benefiting from a holistic analysis of private well stakeholders, out-of-the-box thinking about how disparate data sources might be combined and correlated, and dogged perseverance.

One obvious starting point was New Mexico's Office of the State Engineer (OSE), which issues permits for the drilling of new wells. OSE has records, some going back decades, on private wells throughout the state, including location, depth, construction, and other information. Although the OSE well records existed in electronic format, they did not include a unique identifier for each well or detailed location information. Therefore, data from OSE was most useful only when combined with other sources that had more detailed location information.

Another state agency that seemed to be a likely source of useful well data presented similar challenges. Each year, the New Mexico Environment Department's Ground Water Quality Bureau conducts water fair events, where private well owners can bring samples of their private well water to be tested for free. The bureau has held these events around the state for over 35 years and has now collected over 18,000 well test records. However, DOH staff found that those records were all kept on paper in scattered cabinets and boxes. Practically none had been digitized until DOH began doing so a few years ago. Thirty-five years of well-testing data were invaluable to DOH's efforts, but entering the information into a modern system required a great deal of staff time.

What began as a data collection effort became, in many ways, a networking project.

DATA GATHERING



Some state agencies, like the New Mexico Bureau of Geology and Mineral Resources (NMBGMR) may not be obvious sources for well water data, but they have far more easily accessible sources of useful data. NMBGMR runs an extensive aquifer-mapping project. Miriam Wamsley, formerly a private well epidemiologist at DOH, recalled that the bureau readily shared its well and aquifer data with DOH and is likely to be helpful in the future. “They have a really nice data set that is mapped and easy to digest, and they’re also working on digitizing historical records,” she said.

Federal agencies played a role, too, with similar contrasts between the sources that seemed most obvious and those with the most readily usable data. The US Environmental Protection Agency has worked on private well water quality around the country for many years and, through its Superfund program, has tested, by Miriam Wamsley’s estimate, “thousands of wells over the years” in New Mexico. Wamsley learned that the data from those well tests were in fact held by the state – and stored, it turns out, on the floor above her own office – but those too existed only as paper records that would require a tremendous amount of time to digest and digitize.

In contrast, the US Geological Survey (USGS) – which, like the New Mexico Geology and Mineral Resources Bureau, might not seem to have a direct connection to wells – has private well data from around the state in digital form. USGS quickly shared its data, in Wamsley’s words, in “nice, clean Excel spreadsheets, easy to work with.”

In some cases, gathering data from these agencies was a simple matter of sending an email or making a phone call to the appropriate data steward, with a quick explanation of DOH’s project and its aims. In other cases, DOH staff had to spend considerable time to build trust and convince sometimes siloed agencies to share their well data. Miriam Wamsley attended conferences, workshops, and other in-person meetings where she thought she could connect with representatives from agencies having anything to do with water and wells. “I would give little 5-minute presentations on what our plan was,” said Wamsley. “This is who I am, who I work for, where my funding is coming from. So, no, we don’t have any funding for you, but this is what we’re looking for, and we’d like to know how we can work with you.”

Wamsley highlighted the importance of perseverance and repetition. “It’s always a ‘no’ the first time you ask, and most of the time, it’s a ‘no’ the second time you ask.” She emphasized that “it takes persistence, usually asking for the data multiple times before the data stewards realize what I actually want,” recalling that one Environment Department staffer “saw the presentation three times, and the third time is when it clicked.”

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Miriam Wamsley,
former DOH
epidemiologist

In addition to state and federal agencies, DOH also gathered private well data from the following:

- Local governments like Bernalillo County, where a 2005 ordinance requires water quality tests for all new wells before they're permitted for service
- Multi-state projects like the Four Corners States Biomonitoring Consortium (4CSBC), of which New Mexico is a member and whose prior work, done as the Rocky Mountain Biomonitoring Consortium, had included testing the water quality of private wells

Through their extensive networking and relationship building, DOH staff also found that some agencies or offices that do not hold private well data themselves, such as county agricultural extension offices, may still have helpful insights into other partners that do have useful data.

Practices Changed & Lessons Learned

Uncovering and accessing data that can be added to DOH's private well datasets is ongoing. As DOH finds new sources and new connections, it continues to fill in the gaps in its private well database and to find new ways to use that database to assess and respond to health risks, inform the public, and guide its public health programs. However, the results of DOH's private well data-gathering effort go well beyond programmatic work.

As DOH has contacted agencies with requests for private well data and built relationships that promote data sharing, some of its partner agencies have modified their practices. For example, the Ground Water Quality Bureau (GWQB) now compiles the data from its water fair events in a digital format and shares those data directly with DOH. Additionally, DOH has used its existing data and geospatial analysis to help GWQB concentrate its efforts on areas most in need of additional water quality testing, outreach, or other services. This kind of cooperation and feedback between the two agencies was not happening prior to the conversations prompted by DOH's data-gathering effort.

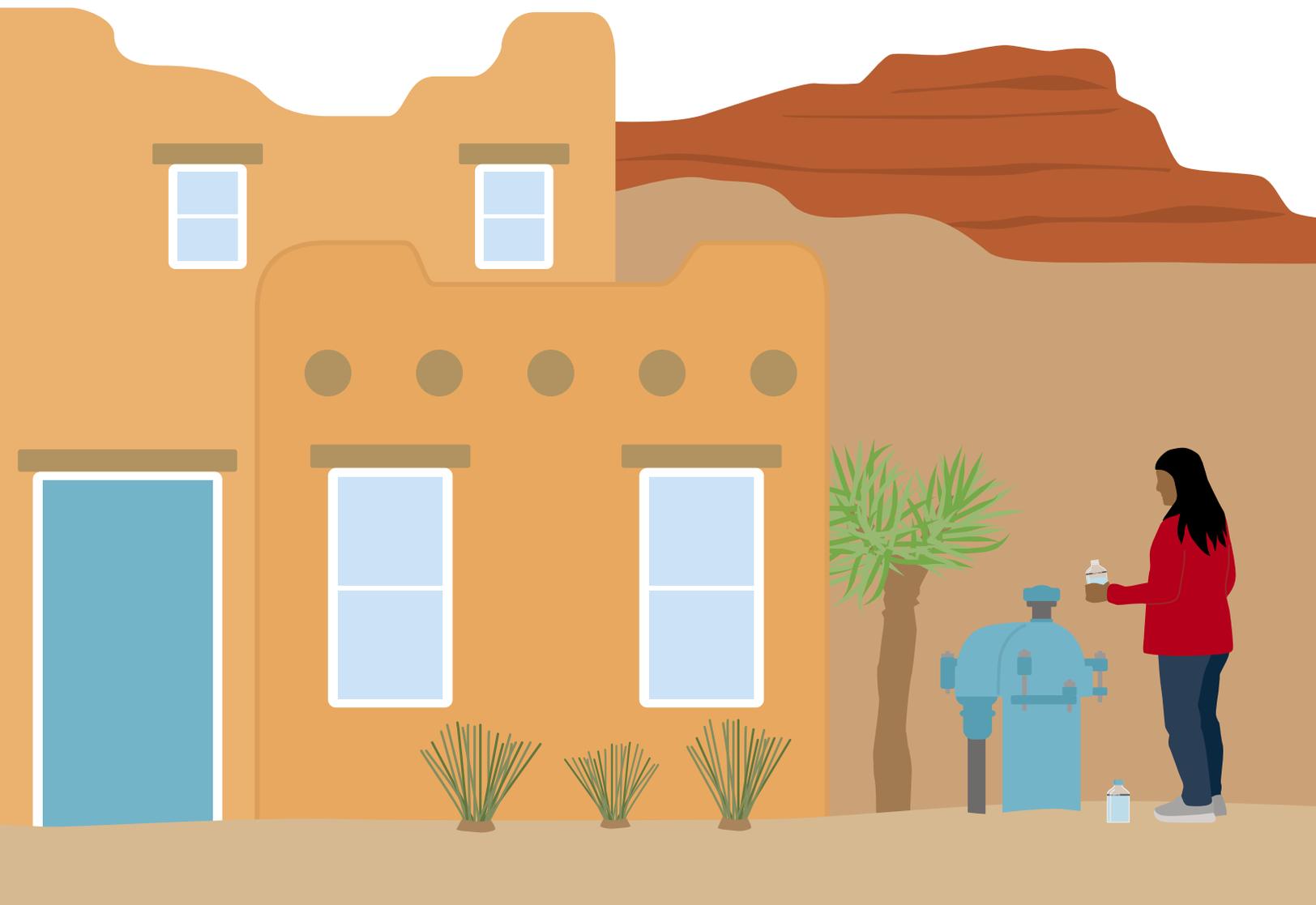
Perhaps most impressively, DOH's need for a unique well identifier to organize its database has led to a significant policy change aimed squarely at that problem. Under new regulations put forward by the Office of the State Engineer and finalized in June 2017, all new wells must be tagged with a unique well ID number.⁹ A physical tag with the ID number is affixed to the well itself, and it can be used to identify and track the well through all permitting and testing processes. (The regulations also require well drillers to record the location of new wells using latitude and longitude as determined by a Global Positioning

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System [GPS] unit.) Though the regulation applies only to newly dug wells, DOH did provide funding for the tagging of up to 6,000 existing wells at no cost to the owner and is working with OSE to encourage more existing well owners to obtain well tags. The use of a unique well identifier will benefit not only DOH and OSE but also the well owners themselves and other agencies that work with private well data.

DOH's data-gathering work has also led to policy changes. For example, DOH used its database to identify areas of the state with high levels of nitrates, which in turn has led the Environment Department's Environmental Health Bureau to change the permitting of wastewater treatment systems in those areas.

Finally, DOH's efforts have pointed the way to additional policy changes that could improve the state's private well database in the future. For example, DOH found that it could not access well-testing data analyzed by private laboratories. Sharing of private laboratory data with state agencies could be mandated by an act of the state legislature, as has been done in other states (notably [Oregon](#)).¹⁰

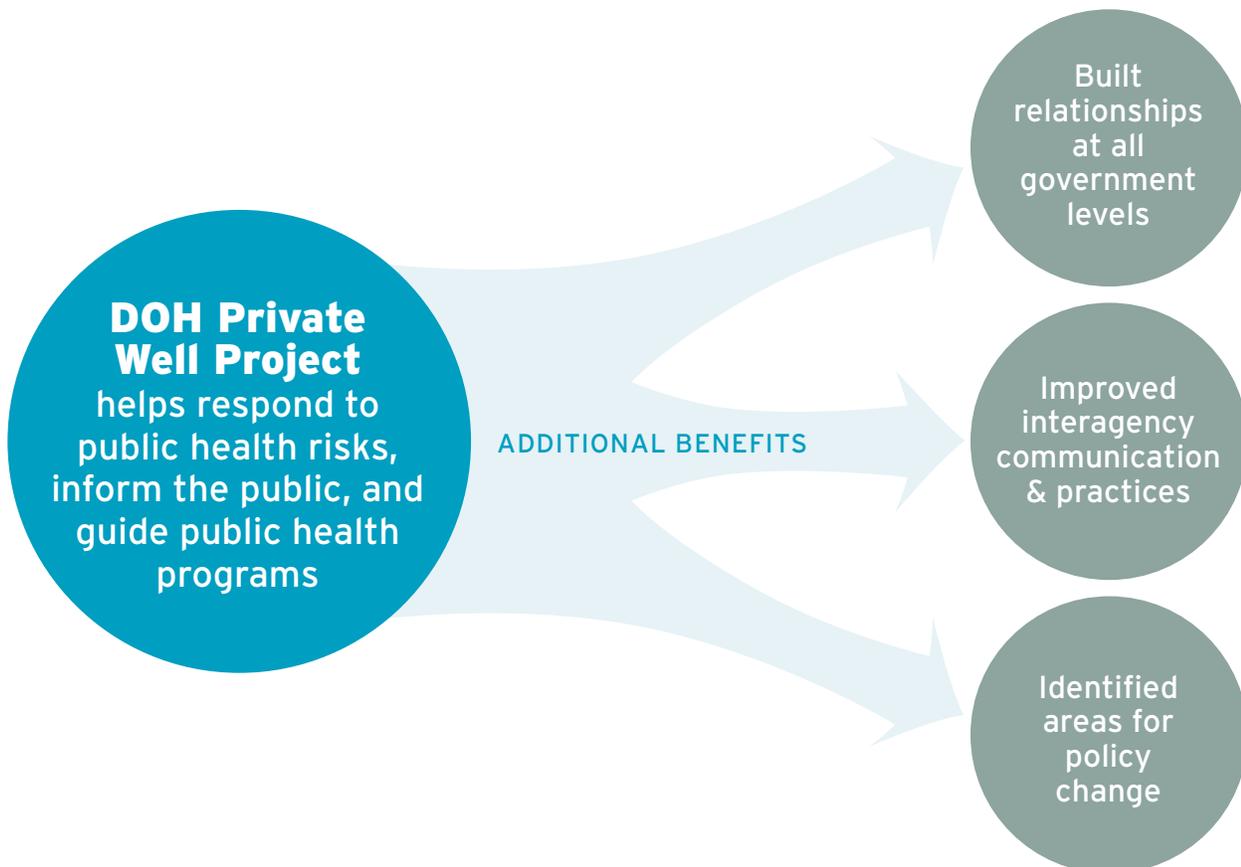


For another agency that is considering tackling this kind of well data problem, New Mexico DOH's experience provides some helpful lessons:

- Begin with a detailed consideration of which data would be most useful.
- Cast a very wide net when identifying likely stakeholders and data partners. Consider connecting with agencies with no obvious connection to well water in order to collect data about wells.
- Remember the importance of in-person networking when courting data stewards in partner organizations.
- Be ready to repeat your appeal to likely data partners multiple times. It may take a while for the message to connect with the right people.

The New Mexico Department of Health began with a seemingly straightforward question: Where can we get data on private wells to help inform and guide our public health programs? In answering that question, DOH has built far more than a database, as helpful as that is. It has built relationships; it has improved interagency communication and practices; and it has moved toward a policy change agenda. DOH's experience shows that pursuing robust public health data requires broad and creative thinking about potential data sources; old-fashioned networking; and persistence. But such an effort can also produce unexpected benefits and help characterize the next problem for an agency to tackle.

DOH has built far more than a database; it has built relationships and improved interagency communication and practices.



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Notes

1. Private Wells Water Quality. New Mexico Environmental Public Health Tracking website. nmtracking.org/environment/water/PrivateWells.html. Updated August 2018. Accessed September 2018.
2. Bryan SM. "Report says hands off New Mexico groundwater." *Santa Fe New Mexican*. July 10, 2018. www.santafenewmexican.com/news/local_news/report-says-hands-off-new-mexico-groundwater/article_5c14fc85-1f55-5037-a954-cc63429f913f.html. Accessed September 2018.
3. Frequently Asked Questions About Water. New Mexico Bureau of Geology and Mineral Resources website. geoinfo.nmt.edu/faq/water. Accessed September 2018.
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5. Private Ground Water Wells. Centers for Disease Control and Prevention website. www.cdc.gov/healthywater/drinking/private/wells/index.html. Accessed September 2018.
6. Well Siting & Potential Contaminants. Centers for Disease Control and Prevention website. www.cdc.gov/healthywater/drinking/private/wells/location.html. Accessed September 2018.
7. New Mexico Administrative Code (NMAC) § 19.27.4 (2017).
8. Bernalillo County (where New Mexico's largest city, Albuquerque, is located) has an ordinance that requires water quality testing for new wells before they are put into service. However, much of Bernalillo County is served by public water supplies, so the local ordinance affects few of the state's private well users. Bernalillo County, New Mexico, Environmental Health Code, art. IV, § 42-541 through 547 (2005).
9. New Mexico Administrative Code (NMAC) § 19.27.4.29 (2017).
10. Or. Rev. Stat. § 448.271.