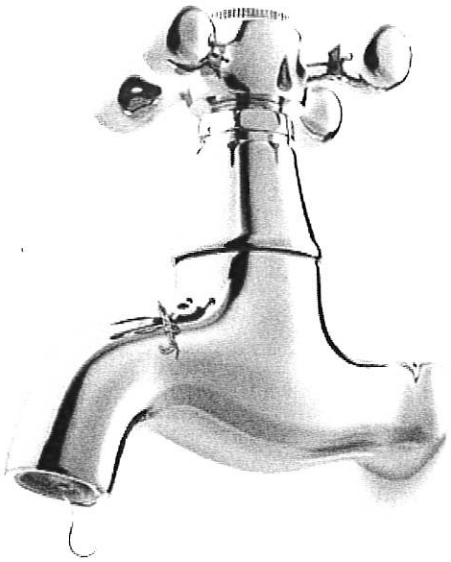

Private Wells:

An Opportunity for Municipalities to Improve Public Health

By Paul Susca

Lead Contamination: Beyond Flint, Michigan

Water from the Flint River began flowing to the taps of Flint, Michigan residents in April 2014. Within less than a month, Flint residents began complaining about the water's color and odor, but it wasn't until late the following year that the Flint water crisis was consistently making national headlines. As is now common knowledge, the problem with water from the Flint River was that it was "corrosive:" although it did not have much lead when it left the treatment plant and entered the City's distribution system, it leached lead out of old service lines (from the water main to the home) and plumbing within customers' homes. As a consequence, Flint residents – children in particular – were exposed to high levels of lead in their tap water. As the Flint story made national headlines in 2014 and 2015, focus on lead in drinking water resulting from inadequate corrosion control spread throughout the country.

While federal authorities work on reforming the regulatory approach to lead in drinking water, New Hampshire Department of Environmental Services (NHDES) has asked schools and child care providers to test for and address elevated lead levels in their facilities. NHDES is also urging community water systems to look for lead components in their distribution systems (sooner than may be required by federal rules) with the goal of removing all lead from water system infrastructure as soon as possible. The good news is that many of New Hampshire's municipal water systems set this goal for themselves long ago and have little lead remaining in their systems. Outreach is also planned for homeowners to similarly identify and remove lead in premise plumbing and to always run the water cold in the morning or when it has been sitting unused for more than 6 hours.

Perfluorinated Compounds: A New Focus

While lead continues to earn attention in the media and the drinking water community, in New Hampshire focus has turned to perfluorinated compounds (PFCs), which were used in certain types of firefighting foam and to make materials such as Teflon and GORE-TEX. PFCs first showed up in a well serving the Pease Tradeport water system in May 2014 and in the Merrimack Village District water system in February 2016. The latter triggered an ongoing statewide hunt for other areas where groundwater might be affected by PFCs, leading to the discovery (as of mid-September) of three more sites that needed further investigation. Unlike typical groundwater contaminants, the PFCs in the Merrimack area (including areas in Litchfield, Bedford and Manchester) were transported by air deposition and affected a much larger area. Since then the state's response – blood testing, bottled water distribution, wellhead treatment, and extension of water service lines in the affected areas – has earned ongoing media coverage.

The Significance of Private Wells

For those affected by PFC contamination of their water supply, the potential health risks are clearly concerning. But the numbers bear comparison with more widespread drinking water contamination in New Hampshire.

As of mid-September 2016, NHDES's PFC investigations had found 171 wells in the Merrimack area and 16 in Amherst with levels of PFCs at or above USEPA's new health advisory level of 70 parts per trillion. In contrast, a report released in 2014 by the U.S. Geological Survey (USGS) estimated that 80,000 residents of southeast New Hampshire are using private wells with levels of toxic metals higher than

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USEPA's drinking water standards.[1] And a report by Dartmouth College for NHDES in 2014 estimated that 62,000 private well users in New Hampshire are drinking water with arsenic at or above USEPA's health-based limit of 10 parts per billion (ppb).[2]

How is it that so many people are drinking contaminated water? A significant factor is the number of private well users in the state—who make up nearly half (46 percent) of the state's residents. In the 2014 Dartmouth College study, most private well users responding to a survey had not had their well water tested within the previous three years, and one in five had never had their water tested. And even when Granite Staters do have their water tested, they often leave out important tests. In the same survey nearly half of those who had their water tested did not have it tested for arsenic, one of the most common toxics in our groundwater. USGS has estimated that 20 percent of private wells in the state have arsenic above the 10 ppb limit that is enforceable for public water systems.[3] And NHDES estimates that 24 percent of bedrock wells have radon levels at or above 10,000 pCi/L, the level at which treatment of water is recommended in conjunction with mitigation of indoor air radon. Testing wells for arsenic and radon is the only way to know what the levels of those contaminants are. The same is true of the other toxic metals in the USGS study and other common contaminants.

For private well users, lead is no less of a problem. A USGS study released in July of 2016 identified New Hampshire as one of 12 states (and the District of Columbia) with a "very high prevalence of potentially corrosive groundwater." Results from private well samples analyzed by the NH Department of Health and Human Services' Public Health Laboratory show how widespread the problem of corrosive well water is. Of more than 10,000 samples of "stagnant" (left sitting overnight) tap water, 70% had detectable amounts of lead and 15% had lead over the 15 ppb "action level" that requires public water systems to control corrosion. Keeping in mind that 15 ppb is not a health-based standard – USEPA's stated goal for lead in drinking water is zero – if that 15% exceedance rate is true of private wells statewide, then roughly 90,000 Granite Staters are living in homes with potentially high levels of lead in their home plumbing. In many cases, drinking water only from the cold water tap and flushing the tap if the water has been sitting overnight will substantially reduce lead levels. But proper testing of tap water is the only way to know whether the stagnant – or even the flushed – water is safe in terms of lead. The same holds true for copper. NHDES recommends that private well users include tests for stagnant and flushed lead and copper when they have their water tested.

A Teachable Moment

In the drinking water program at NHDES, we hear from municipal officials that some homeowners are not even aware that they have private wells, particularly if they have moved from an area where they were served by a public water system. Months after moving in, they call the town office to ask why they haven't received a water bill! Reviewing the seller's disclosure is a teachable moment for those home buyers, and NH Association of Realtors (NHAR) has worked with NHDES to ensure that Realtors are better able to inform home buyers about private wells and about our testing recommendations. In 2015 NHAR and NHDES supported an amendment to RSA 477:4-a, the statute that requires certain non-property specific notifications on the purchase and sales agreement, adding new language regarding both arsenic and radon in private wells.

The goal of NHDES's drinking water program and its partners in private well outreach is that periodic testing of water supplies will be the norm for private well users, and that they will use that information to make informed decisions about treatment of the well water they consume.

Research in New Hampshire and elsewhere has identified the barriers to this goal, which include well users not knowing how to have their water tested, the absence of an obvious problem with their water or their health, cost, and not knowing what to do with the results. After studying these barriers and piloting several approaches to addressing them with funding from the U.S. Centers for Disease Control and Prevention, NHDES and its partners have focused their efforts on two approaches: encouraging community well testing events, and making it easier for well users to move from testing their water to making informed decisions about water treatment systems.

What Can Municipalities Do?

The bad news is that naturally occurring contamination is extensive, and the federal and state drinking water programs have no authority to protect New Hampshire private well users from this threat. The good news is that **municipalities do have authority**, and this presents an opportunity for municipalities to improve public health. A dozen or so New Hampshire municipalities have already taken steps to protect public health by requiring – or at least promoting – private well testing. Bow, Chester, Derry, Pelham, Salem, and Windham require testing of private wells in connection with either a certificate of occupancy or a

property transfer. Another half dozen towns have held community well testing events, and NHDES knows of several more planning to do so. There is now a "toolkit" that local organizers can use to plan and implement local testing events; search the web for "Well Water Community Action Toolkit - Dartmouth College." NHDES has also developed a new online tool, "Be Well Informed," which enables well users to enter the results of their well water tests and receive authoritative guidance about water treatment options based on their unique test results.

Another way for municipalities to increase private well testing is to modify building codes to incorporate a refined definition of "potable water," as described in a guidance document developed by NH Building Officials Association, NH Health Officers Association, NH Planners Association, and NHDES. "Guidance to Refine the Potable Water Definition in New Hampshire Municipal Building Codes" was developed in response to inquiries from health officers and code enforcement officials who want to better protect the health of residents. New Hampshire's State Building Code requires that occupied structures with plumbing fixtures be provided with a potable water supply, defined as "water free from impurities in amounts sufficient to cause disease and harmful physiological effects." Interpreting and administering this definition is difficult for local officials as it does not clearly state which impurities should be considered, nor the amounts in drinking water that are harmful. The new guidance addresses both of those issues. When incorporated into a local building code along with a requirement for water testing, the refined definition does more than require testing; in many cases it would require treatment in order to ensure potability.

Municipalities can help promote improved public health through well testing and treatment using a variety of media such as fliers, community access cable, and workshops. However, experience has shown that these methods are of limited effectiveness, and that towns can do more to improve public health through the regulatory approaches described here or through community well testing events.

NHDES's Drinking Water and Groundwater Bureau has a variety of information and tools on its website – search for "NHDES Private Well Testing." Staff are also happy to speak at local workshops and to provide guidance to municipal officials.

Without widespread use of the tools described in this article or other significant changes from the status quo, a large percentage of New Hampshire residents will continue to take their drinking water for granted and be exposed to harmful levels of contaminants – mostly of natural origin – in their private well-based water supplies. Municipal officials are uniquely positioned to change that.

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[1]Flanagan, S.M., Belaval, Marcel, and Ayotte, J.D., "Arsenic, iron, lead, manganese, and uranium concentrations in private bedrock wells in southeastern New Hampshire, 2012–2013: U.S. Geological Survey Fact Sheet 2014–3042," *http://dx.doi.org/10.3133/fs20143042*.

[2]Borsuk, Mark, Rardin, Laurie, Paul, Michael, and Hampton, Thomas, "Arsenic in Private Wells in NH, Year 1 Final Report, Public Health Contract, Annual Performance Report, CDC Grant #1U53/EH001110-01," October 3, 2014, *http://www.dartmouth.edu/~toxmetal/assets/pdf/Wellreport.pdf*

[3]Ayotte, J.D., Cahillane, Matthew, Hayes, Laura, and Robinson, K.W., "Estimated probability of arsenic in groundwater from bedrock aquifers in New Hampshire, 2011: U.S. Geological Survey Scientific Investigations Report 2012–5156," *http://pubs.usgs.gov/sir/2012/5156/*.