

ARSENIC IN PRIVATE WELL WATER: ENGAGING A VARIETY OF STAKEHOLDERS TO CREATE LASTING CHANGE

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Dartmouth Toxic Metals Superfund Research Program

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Overview

- Private wells and arsenic in New Hampshire
- Current efforts to address arsenic in well water in New Hampshire
- Working with your community to improve well water testing

Section 1: Private wells and arsenic in New Hampshire



Arsenic and Private Wells: The Rundown

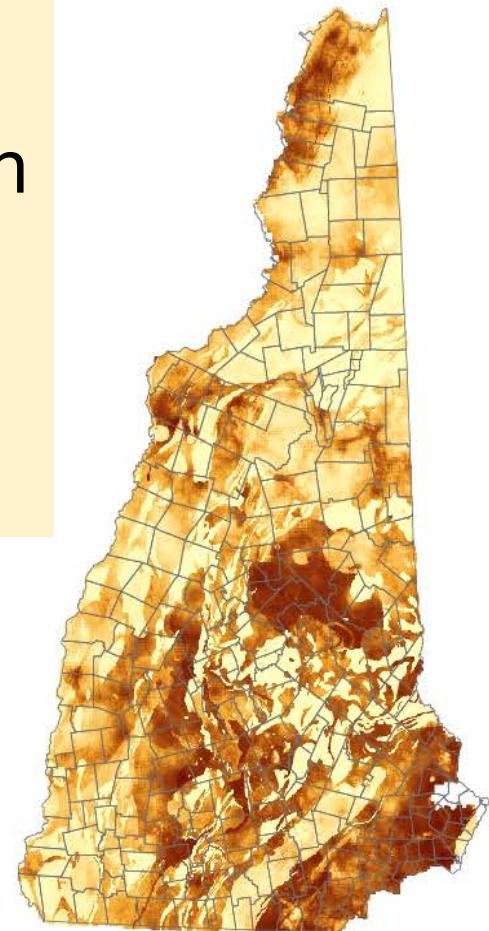
- Private wells serve as a primary source of drinking water for approximately 46% of New Hampshire's population, ~ 520,000 people.
- There is no uniform testing or treatment requirement(s) for private wells in New Hampshire.
- You cannot see, smell or taste arsenic
- **20% of NH private well owners have arsenic levels at or above the U.S. EPA Maximum Contaminant Level (MCL) of 10 parts per billion for public water supplies.**



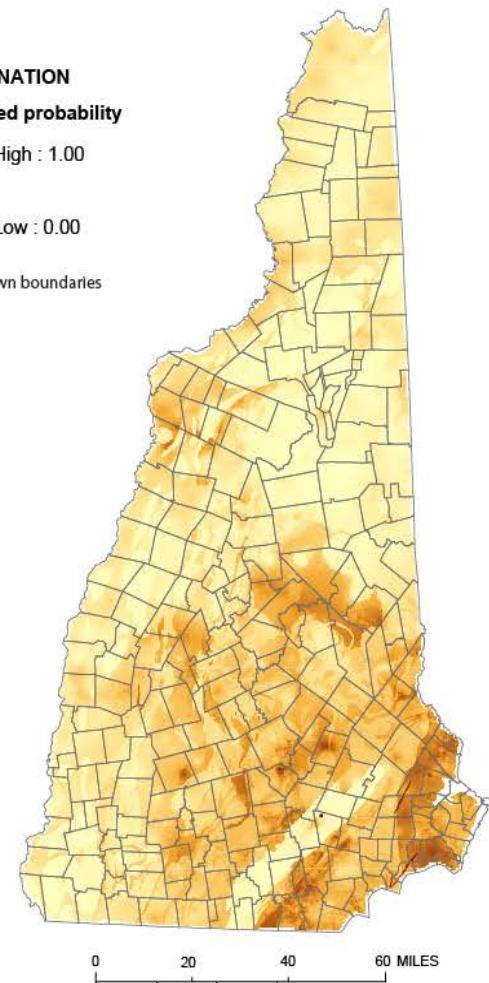
Probability of arsenic in New Hampshire

Most arsenic contamination in NH comes from natural sources

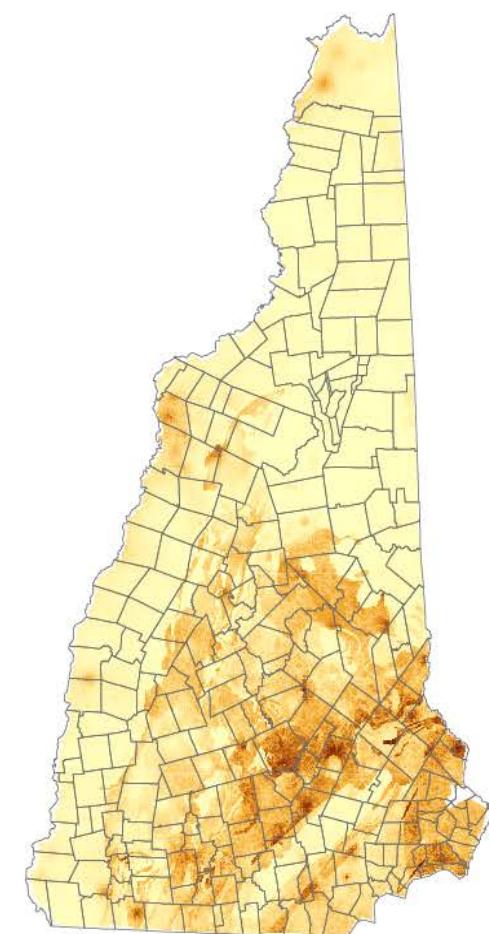
A. Arsenic $\geq 1 \mu\text{g/L}$ model



B. Arsenic $\geq 5 \mu\text{g/L}$ model



C. Arsenic $\geq 10 \mu\text{g/L}$ model



Arsenic and Health

Low dose, chronic, long term exposure to arsenic in drinking water can lead to:

- Cancers (bladder, skin, kidney, liver, prostate and lung)
- Vascular and cardiovascular disease
- Reproductive and developmental effects
- Cognitive and neurological effects
- Diabetes and other metabolic disorders
- Neuropathy

Hughes et al. (2011). "Arsenic Exposure and Toxicology: A Historical Perspective" *Toxicological Sci* 123(2): 305–332.

NH Arsenic Survey

Statewide Online Survey – Summer 2014

- Survey included 31 to 40 questions.
- 700 responses in total.

Survey Analysis

- 82% of respondents drink their tap water “always” or “frequently.”
- Among the 80% of respondents who did test their water:
 - The most common time since testing is **3-10 years ago** (29%).

The strongest considerations for testing were:

- “I wanted to know if the water was **safe to drink**” (77%)
- “I had it tested as part of a **real estate transaction**, or a real estate agent recommended it” (40%).



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win an iPad!*

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Dartmouth College

You Deserve to Know What You're Drinking!

Dartmouth researchers want to help you find out. By completing our survey, you will be supporting efforts to let more people know why and how to get their well water tested.

Please take our quick online survey:
surveymonkey.com/s/nhwells
(at this web address or by scanning QR code at right)

Thanks for participating,

Mark Borsuk
Associate Professor of Engineering
engineering.dartmouth.edu

RESEARCH SPONSORED BY:



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Survey Analysis

- 74% of respondents **understood the test results** they received from the lab.
- 64% of respondents initially **understood what actions** they should take in response to the test results.
- Among the 20% of respondents who **did not test** their water, the most common reasons for not testing were:
 - “I meant to have it tested but never got around to it” (42%)
 - “I didn’t know how to go about having it tested” (38%)
 - “The water looks, smells, and tastes clean” (33%)
- About 40% of well owners from higher risk arsenic towns have not tested their water for arsenic.

Survey Analysis

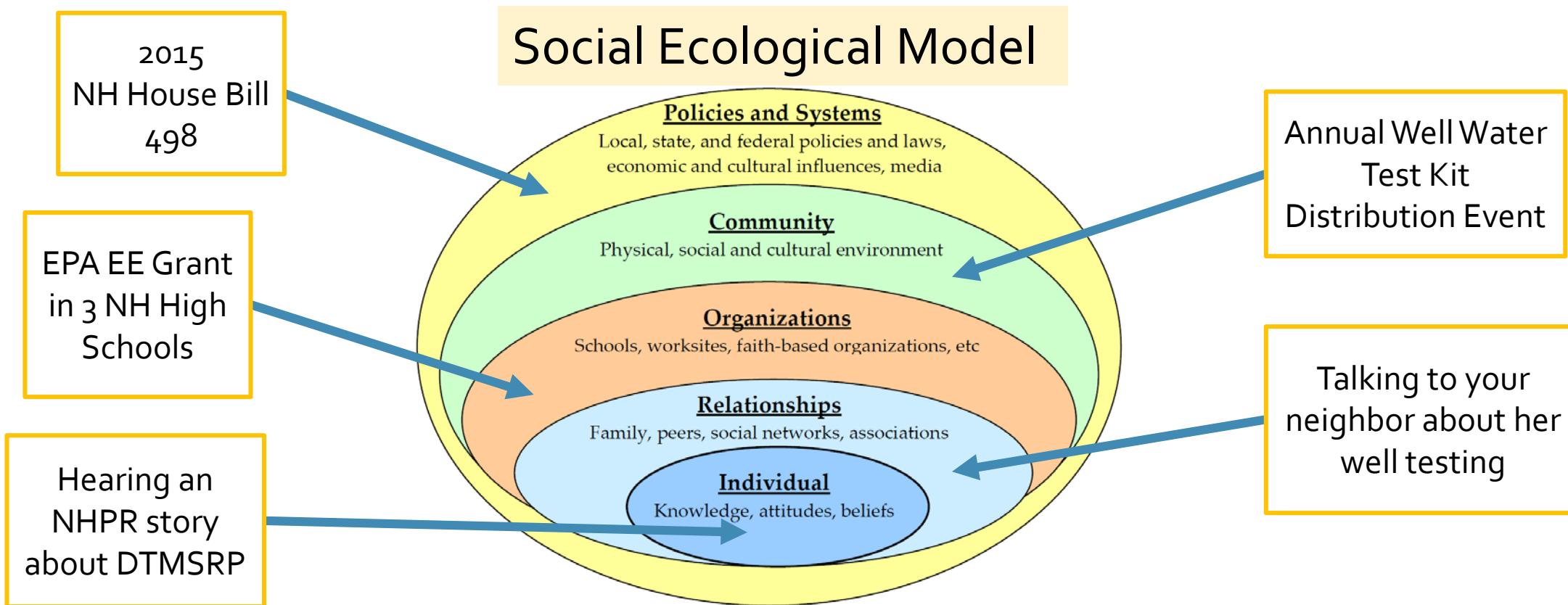
- Among the 67% of respondents who treat their water:
 - 39% have never tested their water since starting to use their water treatment system
 - 46% of those who treat their water and state that their intent is to remove arsenic actually do not have treatment systems that are effective at arsenic removal.
- Among the 33% of respondents who do not treat their water:
 - Only 46% have had their water tested, and received results suggesting there was no need to treat.
 - 16% believe a treatment system is too expensive or difficult to install, use, and maintain.

Section 2:

Current efforts to address arsenic in well water in NH



A comprehensive public health approach to addressing arsenic in drinking water



Adapted from: McElroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Education Quarterly* 15:351-377, 1988.

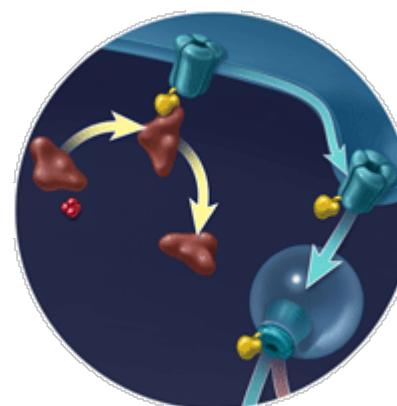
A single entity can “solve” arsenic in NH. Partners and long-term commitment are key!

Current Efforts – Research

Dartmouth Toxic Metals Superfund Research Program

1. Arsenic uptake, transport and storage in plants
2. Arsenic and innate immunity in human lung
3. Epidemiology, biomarkers and exposure assessment of metals

Partners: Dartmouth SRP, International and national academic partners, federal agencies, the general public, NH DES, The Dartmouth Children Center



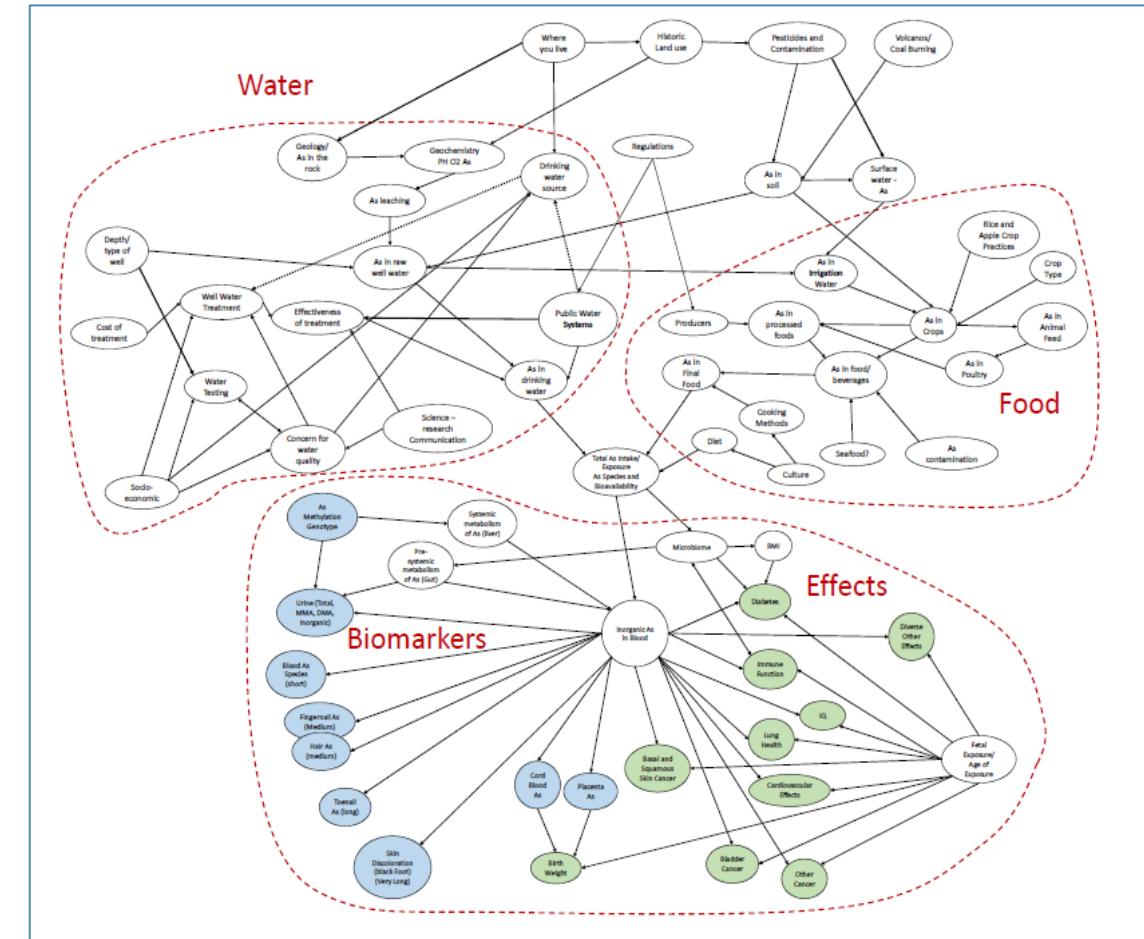
Current Efforts – Research

Arsenic and Risk Communication

Mental Models

A mental model can be thought of as a causal diagram we all create to help us understand something. This mental model can contain both accurate and inaccurate information. It can also contain personal beliefs, facts and myths about a subject.

Partners Dartmouth SRP, State agency partners, academic experts, community members



Current Efforts – Research

US EPA Environmental Education Grant

“Building School and Community Collaborations to eliminate Arsenic from Drinking Water in Maine and New Hampshire: A Model for the US”

Three NH and 4 ME Schools

Partners: Dartmouth SRP, Schools, Students, Towns, US EPA, Mount Desert Island Biological Lab, Maine partners, Southern New Hampshire Health Education Center



NH DHHS Biomonitoring Program – Study # 1

A targeted public health study looking at arsenic and uranium in well water and whether those chemicals are getting into people in NH.

Free well water tests for participants

Partners: NH residents in participating towns, members of the Technical Advisory Group

 **We Need Your Help!**

Why? We are conducting a targeted [public health study](#) looking at the relationship between two chemicals that might be in your [well water](#) (arsenic and uranium) and whether those chemicals are getting into your body.

How long will it take? Less than 2 hours of your time over the course of a few days.

What will I need to do? Answer some survey questions, collect water from your faucet, and collect a urine specimen. All materials for collection and returning the specimens will be provided.

What do I get in return? Free well water and urine tests from the New Hampshire Public Health Laboratories. Your well water and urine will be tested for arsenic and uranium (common chemical contaminants to well water in NH). Your well water will also be tested for other chemicals, [free of charge](#). We will refer you to someone who can help with interpreting results, should you need it.

All of your information will be kept confidential and will only be used for study purposes.

How do I sign up? Please call Amanda Cosser, Study Coordinator, at (603) 271-4611 or Melissa Levesque, Program Specialist, at (603) 271-5113 to enroll or ask questions. You may also email us at BiomonitoringNH@dhhs.nh.gov or register online at: <https://www.surveymonkey.com/r/D86HN8Z>.

<http://www.dhhs.nh.gov/dhhs/lab/biomonitoring.htm>

Para español, utilice la herramienta para traducir al final de la página.



Visit our website to learn more!

Current Efforts – Laws and Regulations

2015 – NH House Bill 498

An act relative to notification of radon and arsenic testing

Expanded notification (with Purchase and Sales Agreement), adding arsenic and radon in water

Partners: NH DHHS, Members of State Government, Community Members, NH Association of Realtors

Town Regulations

Some towns in NH have created town specific well testing requirements. They include:

Bow, Derry, Pelham, Salem, Windham, Chester

Partners: Members of town government, community members

STATE OF NEW HAMPSHIRE

In the Year of Our Lord Two Thousand Fifteen

AN ACT relative to notification of radon and arsenic testing.

Be it Enacted by the Senate and House of Representatives in General Court convened:

171:1 Notification of Radon, Arsenic, and Lead Paint. Amend RSA 477:4-a to read as follows:

477:4-a Notification Required; Radon [Gas], Arsenic, and Lead Paint.

I. Prior to the execution of any contract for the purchase and sale of any interest in real property which includes a building, the seller, or seller's agent, shall provide the following notification to the buyer. The buyer shall acknowledge receipt of this notification by signing a copy of such notification:

"Radon [Gas]: Radon [gas], the product of decay of radioactive materials in rock, may be found in some areas of New Hampshire. [This] Radon gas may pass into a structure through the ground or through water from a deep well. Testing *of the air by a professional certified in radon*

Private Wells - POTABLE WATER TEST RESULTS.

The Board of Selectmen of the Town of Chester, New Hampshire acting under R.S.A. Chapter 147 Section I, and by any other power thereto enabling and acting hereunder and in accordance therewith, has, in the interest of and for the preservation of the public health, duly made and adopted the following rules and regulations

Prior to the issuance of a Certificate of Occupancy for any dwelling supplied by a private well system, the owner shall submit to the Building Inspector the water quality test results, from a NH Certified Well Testing Lab, for the NHDES recommended Standard Analysis as stated in Environmental Fact Sheet^{1,2} WD-DWGB-2-1 dated 2011, as may be amended.

Current Efforts – Tools and Resources

NH DES Be Well Informed Web Tool

Provide an interpretation of lab results in terms of water quality standards. Provides health and treatment technology information. 3,000 users to date

Partners: NH DES, Community Members, NH DHHS lab, private laboratories, water treatment vendors

Well Water Community Action Toolkit

A comprehensive planning tool designed to help communities increase private well water testing and treatment

Partners Dartmouth SRP, NH DES, CDC, Technical Advisory Committee, Community Health Institute, Community Members



Current Efforts – Education and Outreach

Community Presentations

Community well testing events and workshops discussing: Private wells, contaminants, testing, treatment and community engagement

- Workshops held in 7 towns in 2016; 8 testing events
- 2 workshops scheduled for April-May 2017

Partners: Dartmouth SRP, NH DHHS PH Lab, NH DES, Community Members



Current Efforts – Education and Outreach

Arsenic and You Website

Comprehensive information on arsenic in food, water, and other sources.

Partners: Dartmouth SRP, Academic partners, community members, Advisory Board

New Hampshire Arsenic Consortium Meeting

Mission: to help the public, private well users, become aware of the presence and health implications of arsenic in the food and water supply, the importance of testing private wells for arsenic and other common contaminants and how to take the appropriate next steps to reduce their exposure to arsenic from their food and water supply.

Partners: NH DES, Dartmouth SRP, NE USGS, NH DHHS, Academic researchers, general public

Arsenic and You

Information on Arsenic in Food, Water & Other Sources



www.dartmouth.edu/~arsenic/
SAVE THE DATE: Website Launch April 26th

NIEHS
National Institute of Environmental Health Sciences
Superfund Research Program

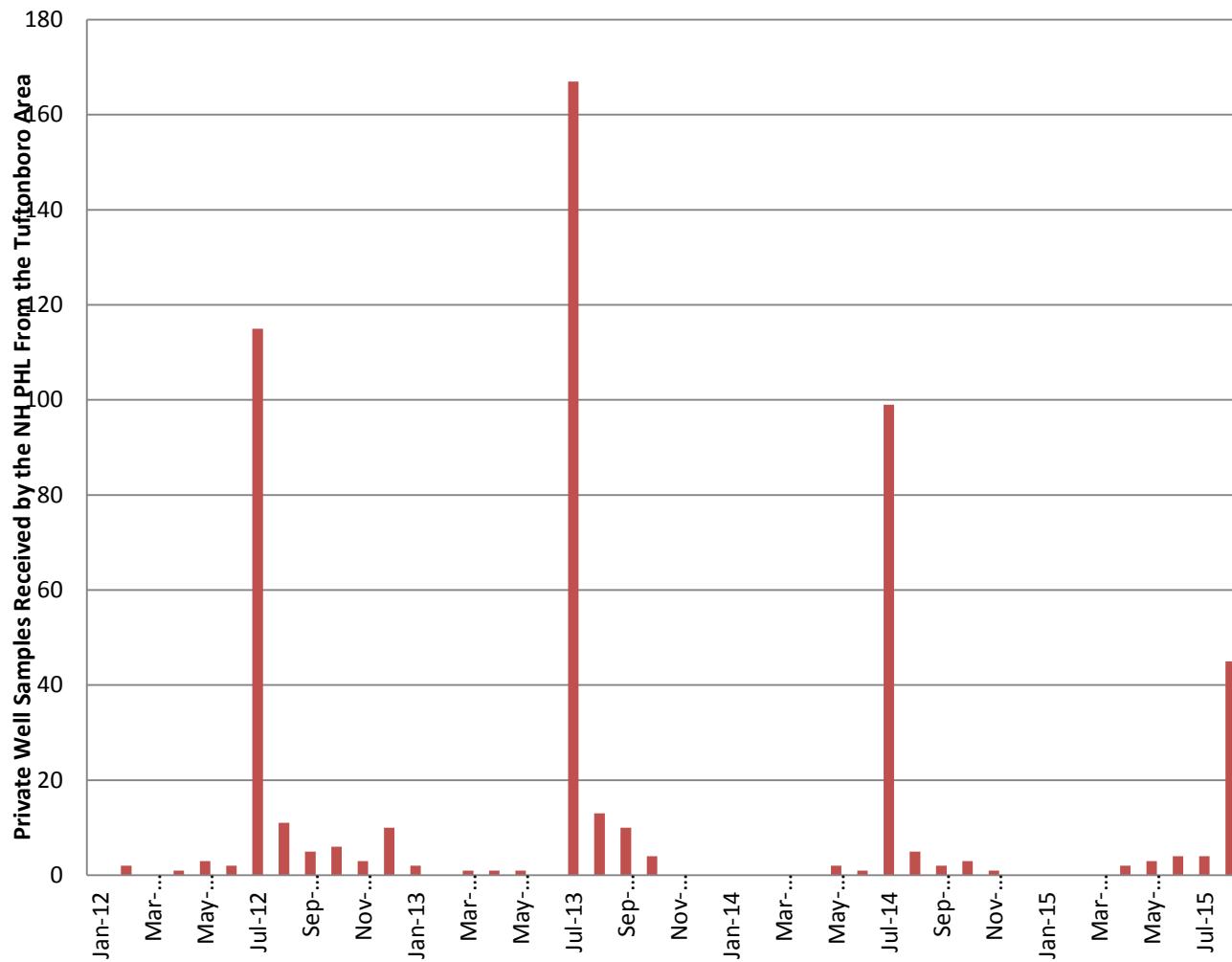


[SAVE THE DATE: October 13, 2017 Concord, NH](#)

Section 3: Working with your community to improve well water testing



Impact of Community Outreach



A 2014/2015 NH DES/Dartmouth grant showed town testing events were effective at **increasing testing** when preceded by town communications. Testing events held in isolation were ineffective at increasing testing.



**Conservation Commission
distributed 172
test kits to the public**

Community Toolkit



Well Water Community Action Toolkit

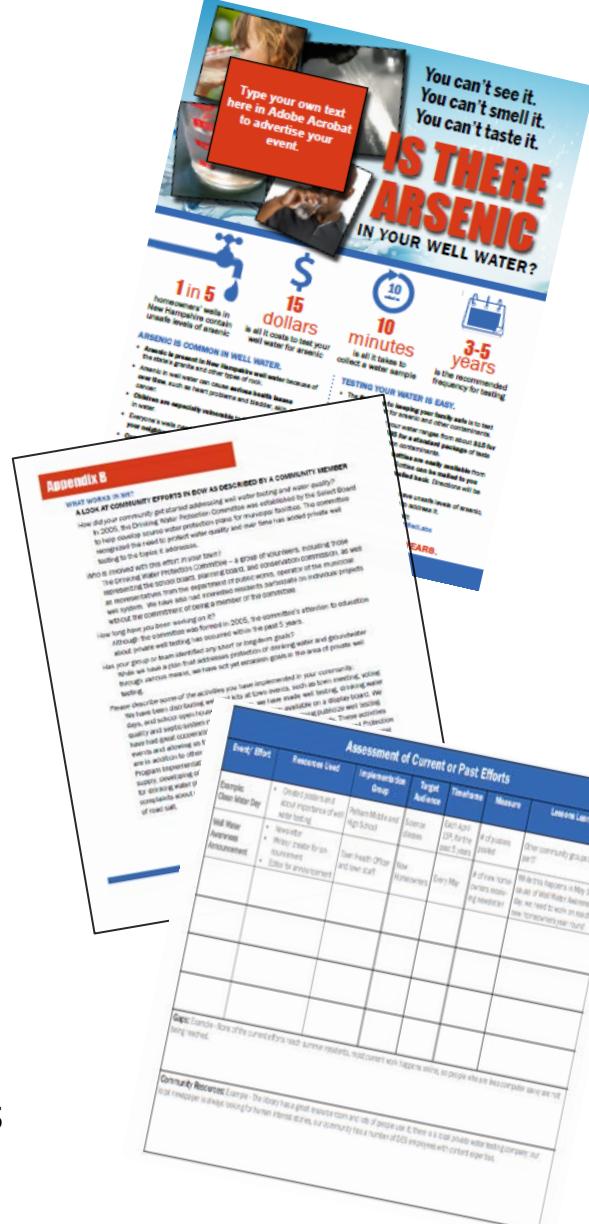
Congratulations on deciding to address private well water safety in your community. This toolkit was designed to help communities increase private well water testing and treatment. In this toolkit, you will find:

- Background information on private wells in New Hampshire
- A step-by-step guide for planning community activities
- Useful resources
- Communication materials
- Project planning worksheets

This toolkit may be used progressively from start to finish or you may choose to jump to the most relevant section that meets your community's needs. Either way the guidance and information provided here will help you work with your community partners and, over time, will create lasting community change.

Toolkit Table of Contents

- Introduction
- Where should you start?
- Creating a plan that works for you and your community
 - Assessment
 - Capacity Building
 - Planning
 - Implementation
 - Monitoring
- Additional Resources and Local Experts
- Appendix A -- Interventions and Communication Materials
- Appendix B -- What works in NH
- Appendix C -- Planning Worksheets



IS THERE ARSENIC IN YOUR WELL WATER?

You can't see it. You can't smell it. You can't taste it.

Type your own text here in Adobe Acrobat to advertise your event!

1 in 5 households with in New Hampshire contain unsafe levels of arsenic.

\$15 dollars is all it costs to test your well water for arsenic.

10 minutes is all it takes to collect a water sample.

3-5 years is the recommended frequency for testing.

TESTING YOUR WATER IS EASY. Testing your family's water is fast. Your water charges for about \$5 for a standard package of tests. You can also have your water tested for free by your local health department or the state health department.

WELL CARE.

APPENDIX B

WHAT WORKS IN NH?

A LOOK AT COMMUNITY EFFORTS IN NH AS DESCRIBED BY A COMMUNITY MEMBER

How is your community getting the arsenic out of their drinking and water quality? In 2005, the Derry Water Protection Committee was established by the community to help coordinate water protection efforts to encourage families in the community to test their water for arsenic.

Who is involved with our efforts in our town?

The Derry Water Protection Committee - a group of citizens, including those representing the schools, town council, town and environmental commissioners, as well as residents who have the experience of testing their water. The committee is also involved in the community as a member of the Derry Water Protection Committee.

How long have you been working on it?

Although the committee was formed in 2005, the committee's attention to education about private well testing has occurred within the past 5 years.

What group or team identifies as your local groundwater protection group?

How we have a plan and activities protection of our drinking water and groundwater through various means.

Please describe some of the activities you have implemented in your community.

We have been distributing educational materials, such as brochures, videos, and pamphlets, to all town residents. Both to town residents, visitors, and tourists. We have made news releases on our website, as well as on a display board. We have also been working with our local town officials to implement a public water system.

What are your successes?

Our community group is now 10 years old.

What is the success of your efforts?

Our community group is now 10 years old.

What are the challenges?

Our community group is now 10 years old.

Assessment of Current or Past Efforts

Event/ Effort	Focus/Goal	Implementation Status	Target Audience	Timeline	Measures	Lessons Learned
Emergency Clean Water Day	On-site water sampling and education on the importance of well water.	Planning/Prepared	Well Water Protection Committee	Open April 2010-2011	Number of people reached	Our community group is now 10 years old.
Well Water Awareness Assessment	• Awareness	Planning/Prepared	Well Water Protection Committee	Open April 2010-2011	Number of people reached	Our community group is now 10 years old.
	• Money raised for projects	Planning/Prepared	Well Water Protection Committee	Open April 2010-2011	Number of people reached	Our community group is now 10 years old.
	• Education for environmental issues	Planning/Prepared	Well Water Protection Committee	Open April 2010-2011	Number of people reached	Our community group is now 10 years old.
	• Education for environmental issues	Planning/Prepared	Well Water Protection Committee	Open April 2010-2011	Number of people reached	Our community group is now 10 years old.
Community Awareness Example	The library has a grant to purchase a water testing kit. It is a \$500 grant with no cost to the library.	Planning/Prepared	Well Water Protection Committee	Open April 2010-2011	Number of people reached	Our community group is now 10 years old.

What can you do?

- Test and treat your well as needed
 - Visit **Be Well Informed** to understand your lab report and learn about treatment technologies
- Educate yourself on the topic
 - Reach out to experts
 - Attend the Arsenic Consortium Meeting
 - Visit the Arsenic and You website
- Work with town partners and community members to:
 - Use the Community Well Water Toolkit to plan
 - Hold a community presentation
 - Discuss town regulation
- Volunteer for the Biomonitoring project (if appropriate)

Thank You!

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**DARTMOUTH TOXIC METALS
SUPERFUND RESEARCH PROGRAM**



Grant #P42ES07373



CDC Grant # 1U53/ES00110-01