NC Public Health's Efforts to Improve the State's Well Program Past & Future Grants

2021 NCEHSOP Onsite/Well

Virtual Course

Phoebe Shurtleff

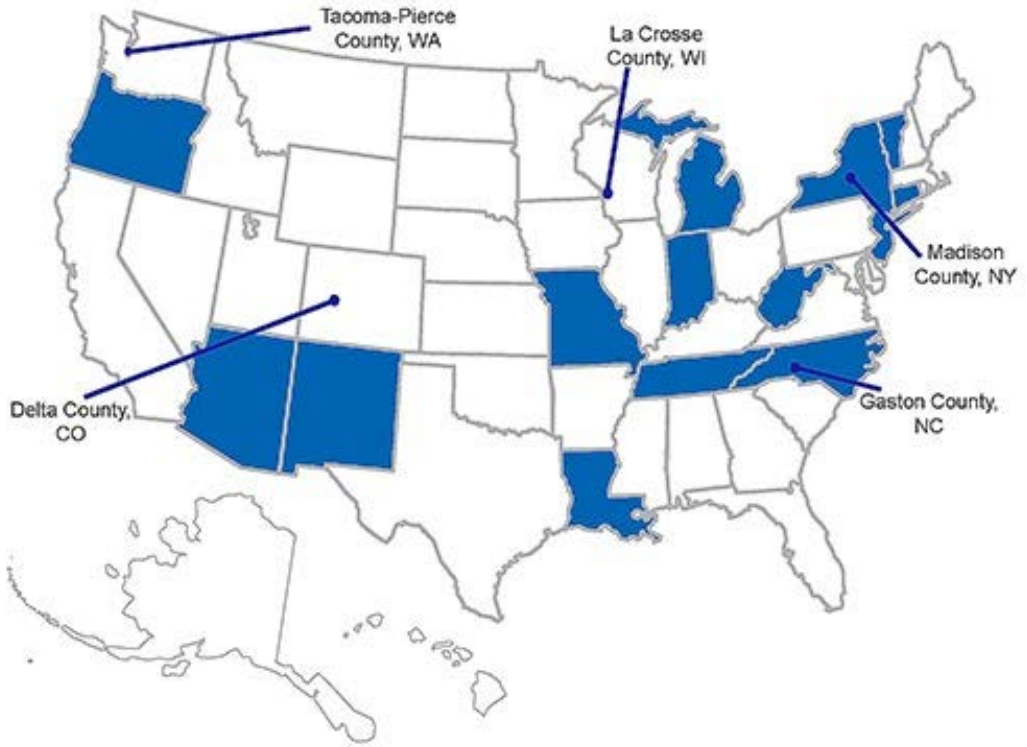
Occupational and Environmental Epidemiology Branch

- Our mission is to identify and evaluate occupational and environmental health concerns and provide unbiased evidence-based recommendation to reduce or prevent the incidence and severity of harmful exposures and their health outcomes

- In a nutshell: Work to reduce or prevent exposure to harmful agents in the environment or that may be present at work

- **Private Well and Health Program**
  - Work to reduce or prevent exposure to harmful agents found in private wells

NCPH
North Carolina Public Health



Private Well and Health Program

Activities funded through a CDC Cooperative Agreement

Safe Water for Community Health Grant

Outreach to underserved populations

Develop resources to build capacity at Local Health Departments

Develop a private well contaminants surveillance system

Develop communication material to pursued Private well Owners to test, treat and maintain their wells.

NCPH
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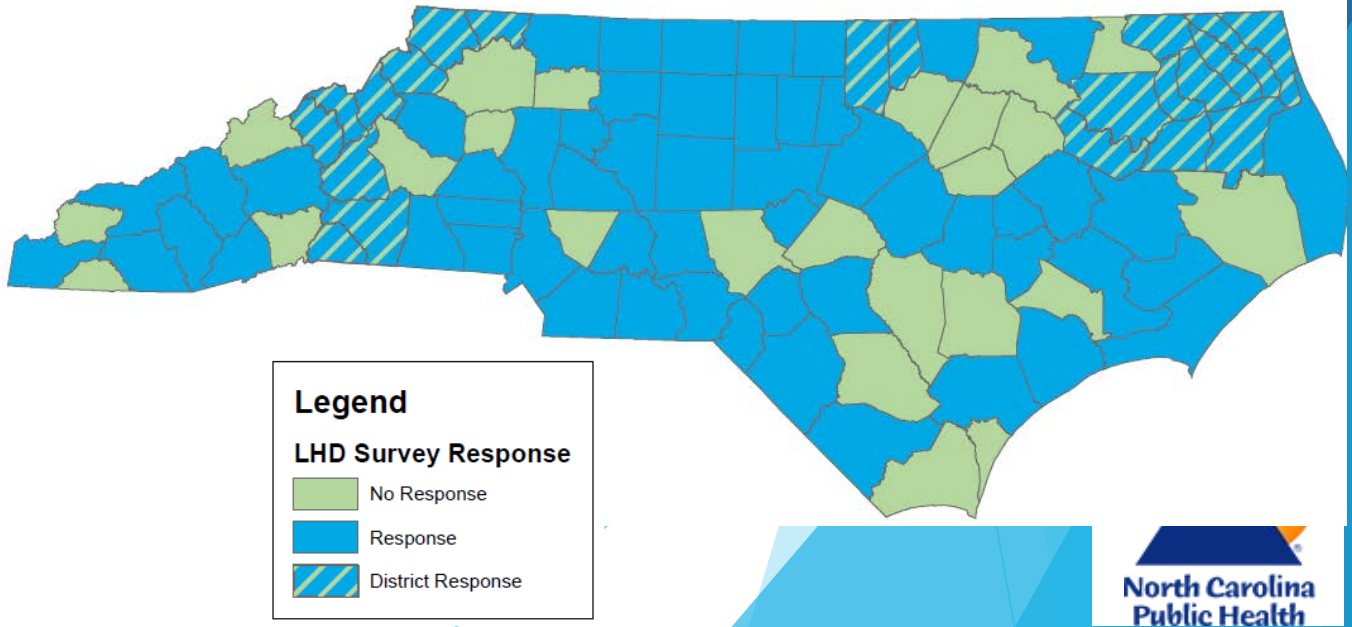
Goal 2

- Survey to assess resource needs
  - June 27 – August 4, 2017
  - Additional Collaborators:
    - NC DHHS On-site Water Protection Branch
    - Several NC LHD officials
  - Response Rate
    - 64 LHDs
    - Representing 75 counties

Response Distribution of LHDs



Goal 2

Virginia Tech
Invent the Future

- **Most Asked Topics by Well Owner**
  1. Well Testing
  2. Well Permitting-New Wells
  3. Understanding Water Tests
  4. Well Permitting-Abandoned or Repaired Wells

- **Health Dept. Most Important Activities**
  1. Well Permitting-New Wells
  2. Well Testing
  3. Well and Grout Inspections
  4. Well Permitting-Abandoned or Repaired Wells

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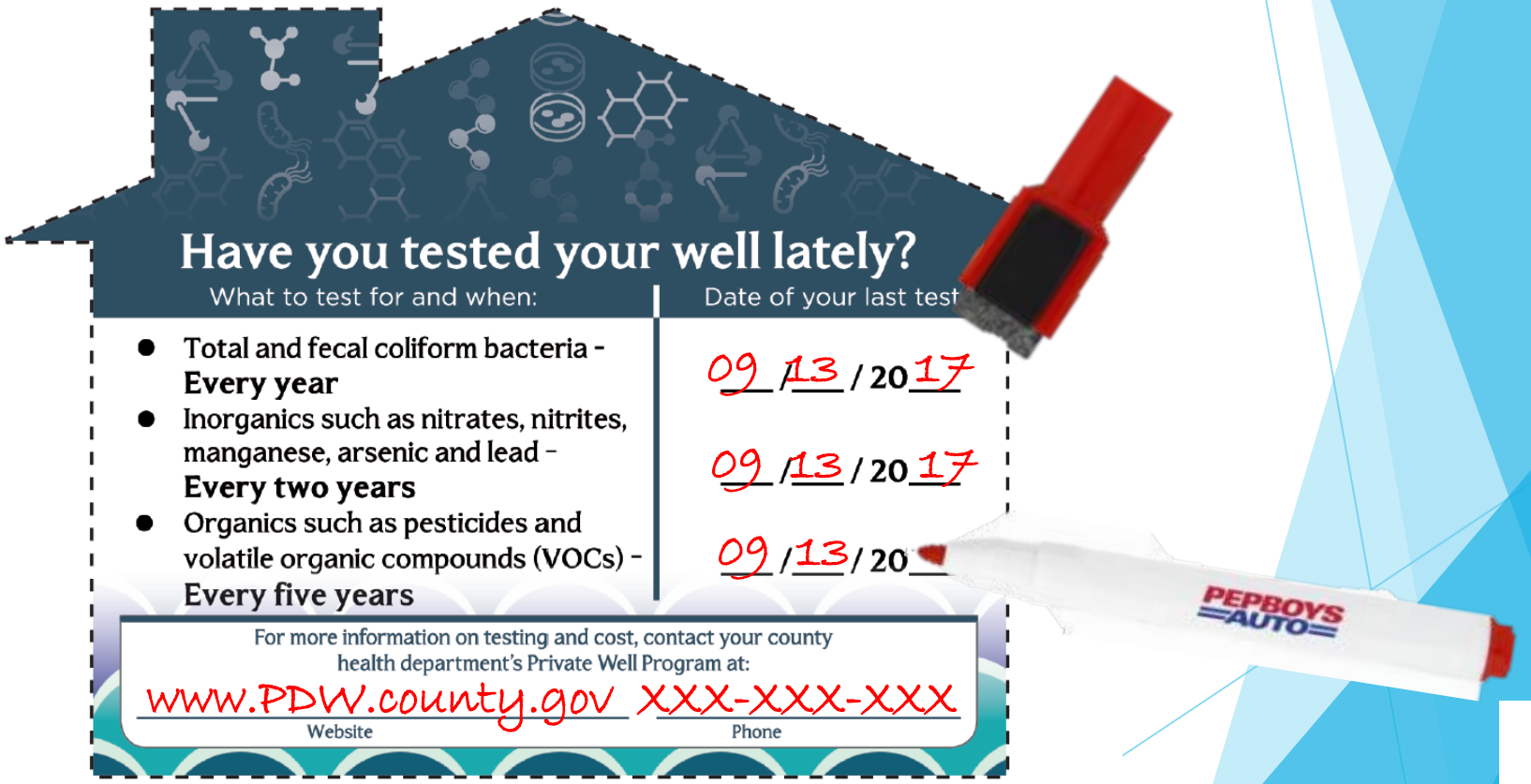
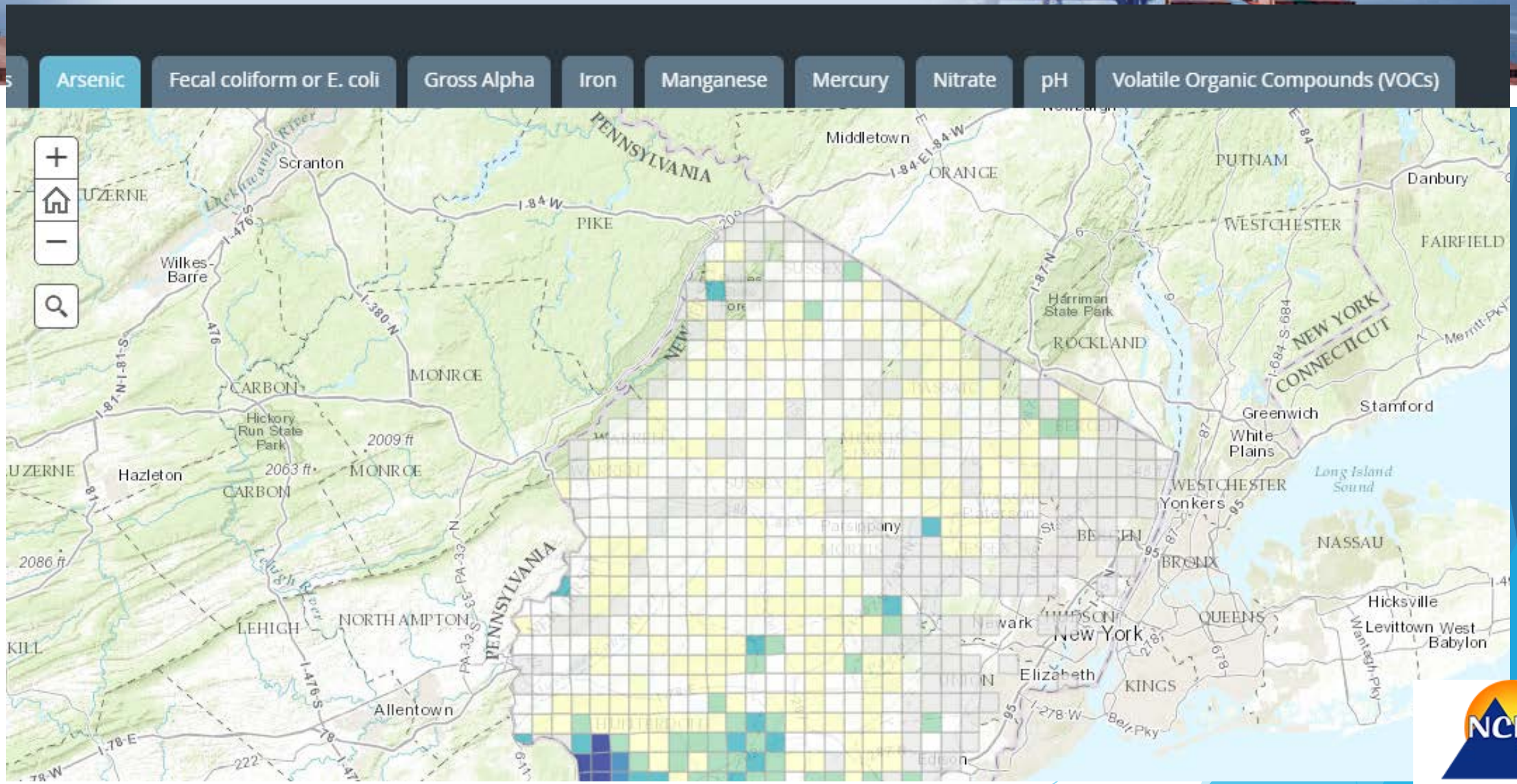
Communication Material for Residents

- Testing Reminder Magnets





North Carolina Public Health

Private Wells in North Carolina

100 Counties

84 LHDs

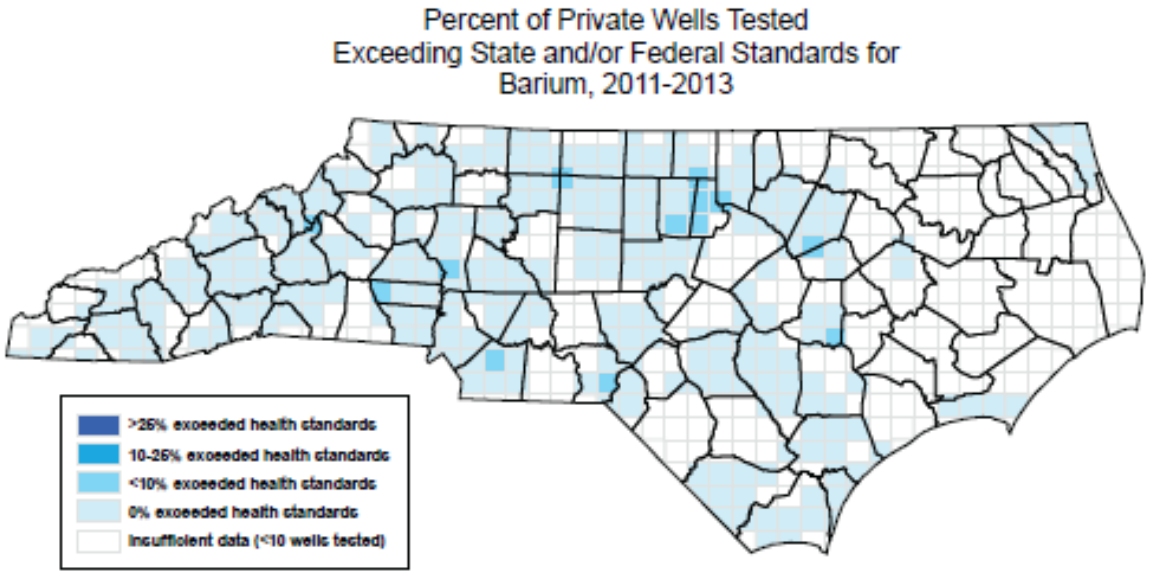
84 Well Programs

84 areas of state seeing different well water resources

How to address the variability?

- Work with VA Tech to develop a statewide online website
  - Information on Well Testing
  - Directory of LHD Well Programs
  - Hub for Resources

Fact Sheets for Contaminants



- The Private Well and Health Program created 17 in-depth factsheets containing information on common contaminants found in private wells
- Included 10x10 mile grid information highlighting the occurrence of contaminants across the state

Fact Sheets for Contaminants

Barium & PRIVATE WELLS

What is barium?

Barium is a natural element found in rocks deep underground. In the environment, barium is found as barium compounds joined to other elements like sulfur, carbon, and oxygen.

Barium compounds are used in the oil and gas industry and in some medical practices. They can also be found in paint, bricks, ceramics, glass, and rubber.

How does barium get in my private well water?

Barium compounds can enter your private well water from erosion of rocks underground. Barium can also enter groundwater from industrial practices.

If a barium compound is very soluble or easily dissolves in water, it is more likely to be found in well water. Acidic water (with low pH) can make barium compounds more soluble.

How can barium affect my health?

Barium is not considered an essential element, meaning your body does not require it. You can't see, smell, or taste barium.

Drinking high levels of barium over short periods can lead to:

- Vomiting
- Stomach cramps
- Diarrhea
- Difficulties breathing
- Changes in blood pressure
- Numbness around the face
- Muscle weakness.

Higher levels of barium can cause changes in heart rhythm or paralysis and death. Drinking barium over long periods may lead to kidney damage, weight loss and death.

What level of barium should I be concerned about?

The **NC Department of Environmental Quality** developed a groundwater standard of **0.7 milligrams of barium per liter of water (mg/L)**. Ground water standards are developed to protect public health. This standard was developed in 2013.

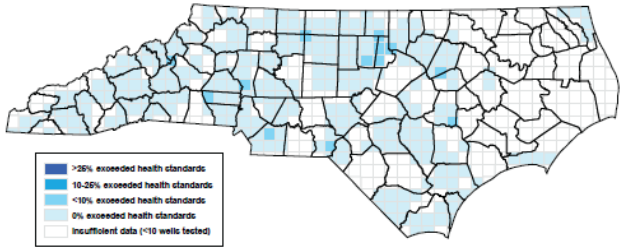
The **US Environmental Protection Agency** developed a public drinking water standard of **2 mg/L**. Public drinking water standards are based on public health protection and cost of treatment/ testing at large utilities. This standard was developed in 1993 and validated in 2017.

What if my barium levels are high?

You can install a treatment system to reduce the levels of barium in your private well. Treatment systems that reduce the levels of barium in your well water include:

- Cation exchange, also known as a Water Softener
- Distillation
- Reverse osmosis

Percent of Private Wells Tested Exceeding State and/or Federal Standards for Barium, 2011-2013



You can also reduce your exposure by using bottled water or connecting to public water supply, if possible.

How do I test for barium in my private well?

Use a certified lab to test your well water for barium every two years, as part of the inorganic panel screen. Contact the private well program at your county health department to assist you with getting your water tested. Pricing of testing varies from county to county.

Where is barium found in NC?

Barium is found at varying levels (0.1-2.1 mg/L) throughout NC. **Less than 1%** of wells sampled for barium in NC from 2011 to 2013 exceeded state and/ or federal standards. Yet, there are several areas in NC with at least 10% of the wells exceeding state and/or federal standards. See map for areas with elevated barium.

Where can I find more information about barium and my well?

Visit the NC Division of Public Health's Private Well and Health Program website: http://epi.publichealth.nc.gov/oee/programs/wellwater.html.

There you can find:

- Contacts for your county private well program
- Barium in well water maps
- A guide for selecting a treatment system
- Other private well resources

You can also call the Private Well and Health Program at 919-707-5900.

Where did this information come from?

Agency for Toxic Substances & Disease Registry: www.atsdr.cdc.gov/toxfaqs/tfacts24.pdf

World Health Organization: www.who.int/water_sanitation_health/dwq/chemicals/barium.pdf

National Sanitation Foundation: www.nsf.org/consumer-resources/what-is-nsf-certification/water-filters-treatment-certification/contaminant-reduction-claims-guide

NC Department of Health and Human Services • Division of Public Health • Epidemiology Section • Occupational and Environmental Epidemiology Branch • Private Well and Health Program • https://epi.publichealth.nc.gov/oee/programs/wellwater.html • NCDHHS is an equal opportunity employer and provider. • 09/2019

Treatment Brochure

- Developed a treatment brochure for residents containing information on different treatment options based on the contaminant of concern
- Increases awareness of different options and decreases chances of residents being swindled by “water filtration companies”

1. Contaminants that can affect your health.

Contaminant	Filtration	Ion Exchange	Distillation	Reverse Osmosis	Chlorination
Arsenic	Activated Carbon		✓	✓	
Barium		Cation Exchange	✓	✓	
Cadmium	Activated Carbon		✓	✓	
Chromium	Activated Carbon	Anion Exchange	✓	✓	
Lead	Activated Carbon		✓	✓	
Mercury	Activated Carbon				
Nitrate/Nitrite		Anion Exchange	✓	✓	
Selenium		Anion Exchange	✓	✓	
E. Coli	Ultraviolet		✓	✓	✓
Total Coliform	Ultraviolet		✓	✓	✓
VOCs/Pesticides	Activated Carbon			✓	

2. Contaminants that can affect your health and can cause aesthetic, cosmetic or technical effects in your well.

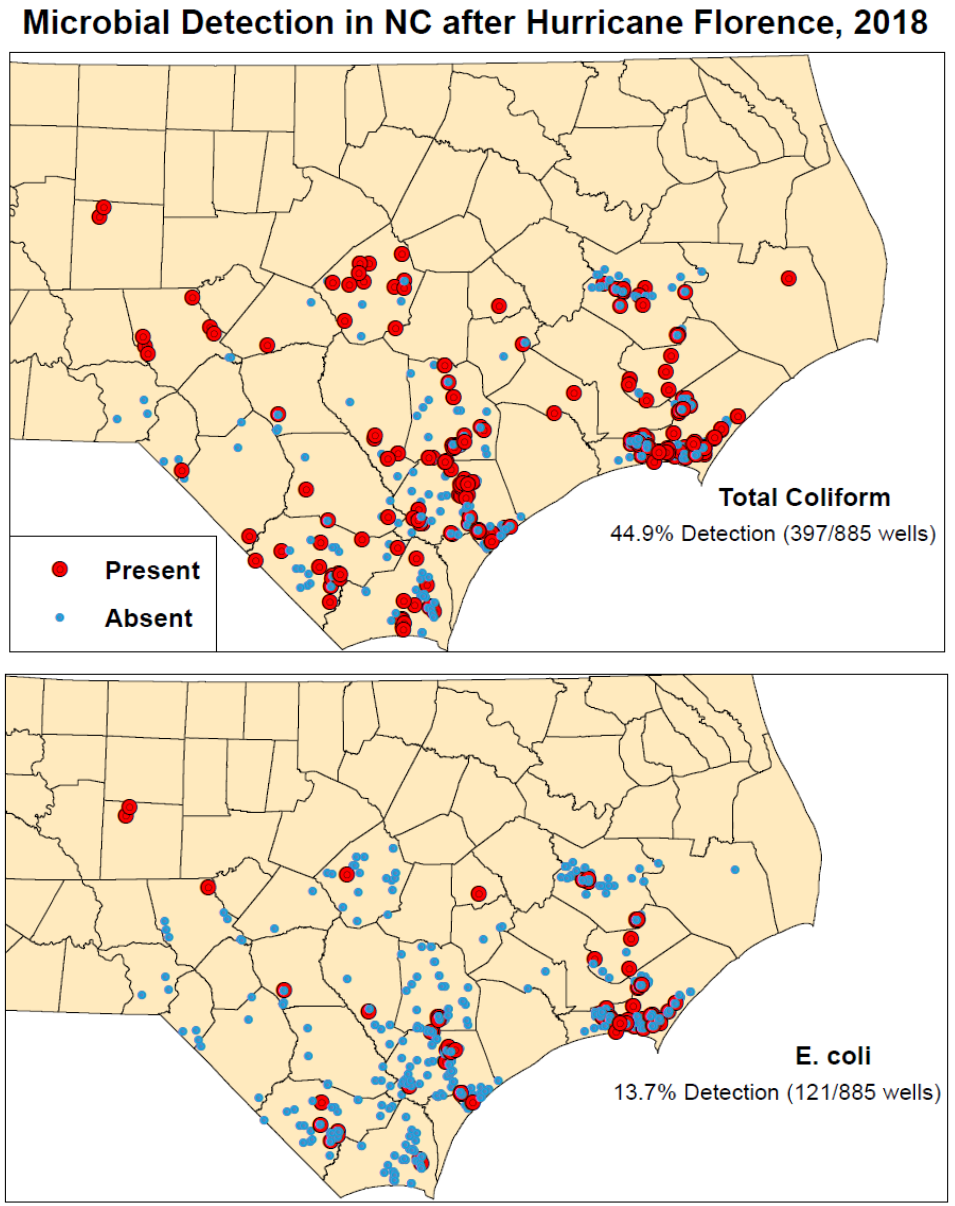
Contaminant	Filtration	Ion Exchange	Distillation	Reverse Osmosis	Chlorination
Copper	Activate Carbon	Cation Exchange	✓	✓	
Fluoride		Both	✓	✓	
Iron	Oxidizing	Cation Exchange			
Manganese	Oxidizing	Cation Exchange			
Silver		Cation Exchange	✓	✓	
Sodium			✓	✓	
Zinc	Activate Carbon				

3. Contaminants that can cause aesthetic, cosmetic or technical effects in your well.

Contaminant	Filtration	Ion Exchange	Distillation	Reverse Osmosis	Chlorination
Calcium		Cation Exchange			
Chloride			✓	✓	
Magnesium		Cation Exchange			
pH	Neutralizing				
Sulfate					
Total Alkalinity	Neutralizing				
Total Hardness		Cation Exchange			
Turbidity/ Sediment	Sediment			✓	

Emergency Preparedness

- Tracking private well contamination following major natural disasters and flooding events
- End goal: Identify areas of increased vulnerability for flooding and concentrate educational materials



Disinfection Door Hanger

- As a result of identifying areas of vulnerability after Hurricane Florence, a door hanger for private well owners was created to inform residents on the process of shock chlorination and to reiterate the need for bacterial testing after a flooding event
- A more descriptive version that shows calculation of bleach needed based on size of well is available online as well

Disinfection Door Hanger

How should I prepare my well for a flood?

1. Store adequate bottled water for drinking and cooking because you won't be able to drink, brush teeth or cook with the well water until it is tested and found suitable.
2. Fill the pressure tank as much as possible.
3. Turn off the electricity to the well.
4. If you have an aerobic septic system, turn off the electricity for the system. No special preparations are recommended for conventional septic systems.
5. If your wellhead does not have a watertight seal, clean the well casing, cover with a heavy-duty trash bag and secure with waterproof tape.
6. Locate:
   a. A nearby water testing lab to obtain sample collection bottles and instructions. Often, your local health department can test your water for bacterial contamination. If there is not a health department near you, your county Extension agent can help you find a lab.
   b. The log/well report completed when the well was established and store a copy in a safe place that will be accessible if you evacuate.
   c. Contact information for licensed well drillers in the area. You can find a list of certified well contractors at www.ncwelldriller.org/web/eh/find-contractor.

What if I must evacuate?

You can take action to prepare your well for a flood, even as you are making plans to evacuate. Follow the steps above. Consider purchasing in advance the supplies you will need when it is safe to return. If you plan to attempt to disinfect your well, basic shock chlorination materials may be difficult to acquire following a flood. Here's what you will need:

a. Instructions on how to shock chlorinate
b. Unscented, liquid bleach
c. Clean five-gallon bucket and five gallons of uncontaminated water
d. Garden hose that reaches from an outdoor faucet to the well
e. Protective goggles and gloves
f. Wrench for well access
g. Funnel
h. Hose
i. Sample collection bottles from local water testing lab.

What should I do after a flood?

1. Do not turn on the electricity to your pump until flood waters have receded.
2. If extensive flooding has occurred, do not drink the water. Use your water reserves and bottled water until your well water has been tested.
3. Contact a driller/s before evacuating if you think your well will need service immediately after the flood. You can find a list of certified well contractors at www.ncwelldriller.org/web/eh/find-contractor.
4. If you haven't already, find a nearby water testing lab to obtain sample collection bottles and instructions for bacterial contamination. You cannot see, taste or smell bacterial contamination in your well.
   a. If you live near animal feeding operations, agricultural fields where pesticides are applied or industrial chemical factories, contact your local health department for additional testing, especially if you smell fuel or chemicals in your water.

      If there is bacterial contamination, do not use contaminated water for: drinking, cooking, making ice, bathing in any form and/or washing clothes or dishes.

      Use an alternative water source until bacteria is no longer detected in your water. Alternative sources include bottled water, a source you know isn't contaminated or boiling your water for five minutes before use.

      It is strongly recommended to call your local health department or a licensed well driller to shock chlorinate the well if it has been flooded. A water well driller will have access to more effective products and will have equipment and experience that a typical well owner will not have.

Who can I call with more questions?

Contact your local health department or a certified well driller for professional assistance. A list of certified well contractors is available at www.ncwelldriller.org/web/eh/find-contractor.

IMPORTANT: Before using the water for drinking, cooking, making ice or preparing food, have the water tested by a Department of Health certified laboratory. If disinfection attempts fail, the well may need to be cleaned before it is disinfected again. Contact a contractor or local health department for help.

New Well Owner Survey

- 12,000 surveys sent out to new private well owners through SLPH
- Well owners answered questions about receiving and interpreting private well water samples from SLPH, any actions taken after receiving results, and any concerns about contaminants in private wells
- 1,439 surveys returned online and through the mail
- The final report will be published in 2022

Results

- The majority (61-79%) of respondents indicated that they did receive their original test and HRE
- The majority (94%) of the respondents who received their HRE found it easy or very easy to understand and understood what steps (if any) were suggested to them based on their test results
- The most commonly reported treatment behavior after receiving test results was the installation of a point of entry (whole house) system
- Respondents seemed most concerned about naturally occurring metals (lead, arsenic, manganese) and bacteria
- Among those who expressed other concerns regarding their private well, concerns included well construction/well driller competencies, and a desire to know proper private well maintenance, testing, and general private well stewardship practices

BREHC Purpose

- BREHC is a cooperative agreement between NC DHHS and the CDC.
- BREHC will use EH data to **raise awareness and educate residents** about the importance and impacts of EH hazards and will increase cross-sector collaboration to prevent and control exposure to EH hazards that are present in communities
- **Focus on EH hazards associated with private wells** and exacerbated by extreme flooding events.
- The purpose of the BREHC program is to **improve the capacity of NCDHHS to identify, detect and prevent exposures** to environmental hazards. BREHC will address EH hazards within North Carolina to improve children's health, minority health and rural health.

Activity 1: Establish platforms and protocols for collecting and analyzing private well EH

Activity 2: Analyze barriers to safe drinking water

Activity 3: Decrease childhood exposure to private well contaminants

Component B

Component B – Activity 1 *(Well water Protocols)* Outcomes

Short term

- Increase access to private well EH data

Intermediate

- Increase cross-sector collaboration with partners to address private well EH hazards

Component B – Activity 2 *(Drinking Water Barriers)* Outcomes

Intermediate

- Hazards in drinking water obtained from private wells identified and controlled
- Strengthen coordination between interventions addressing the triad of agent, host, and environmental components of disease

Component B – Activity 3 *(Childhood Contaminant Exposure)* Outcomes

Short term

- Increase awareness of private well EH hazards among partners and the general public

Intermediate

- Address, prevent, and control private well EH hazards
- Strengthen coordination between interventions addressing the triad of agent, host, and environmental components of disease

Long term

- Reduction in private well EH hazards which results in improved environmental conditions and community health status

THANK YOU!!!!!

- VA Polytechnic: Dr. Kelsey Pieper, Kory Wait
- Centers for Disease Control and Prevention

- Questions??

- Phoebe.Shurtleff@dhhs.nc.gov
- **Division of Public Health**
  Occupation and Environmental Epidemiology Branch