National Healthy Homes Training Narrative

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**Protecting Public Health through Private Well Testing and Treatment**

Private (Domestic) Well Water Quality and Public Health

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1. **National Center for Healthy Housing Health, Housing, and Environmental Professionals**

This presentation was developed for the National Center for Healthy Housing which works with health, housing, and environmental professionals to address issues surrounding unhealthy and unsafe homes. This presentation is geared toward those professionals who may have the opportunity to address contaminants in drinking water from private wells, treatment and health issues as part of their work related to the Center’s mission. A private well is one that is a source of drinking water, privately owned and not subject to requirements on federal or state Safe Drinking Water legislation.

1. **What will this presentation cover?**

The purpose of this training is to provide an overview of the issues associated with the health risks presented by consumption of groundwater contaminants commonly found in private wells. As a provider of services related to healthy homes, the people you serve could benefit from assistance or information that you may refer or provide concerning the need to test and treat their home’s private well water. Our shared goal is to minimize exposure to contaminants that may affect their family’s health.

It’s important to maintain high quality drinking water from domestic wells. Many people throughout the country rely primarily on private (domestic) water wells as their primary source of drinking water; however, private well water quality and treatment to remove contaminants are not regulated in most states. First and foremost it is up to private well users to ensure that well water is free of common contaminants which can have both immediate (acute) and chronic (long-term) human health impacts, which can be severe in some cases.

There are resources in many states already available to guide private well owners published by public, private and academic institutions that provide guidance on well water testing (which contaminants to test for), how to interpret water quality from lab results and water treatment options. The effectiveness of private well guidance and interventions with private well users is a topic that is now getting more attention by national organizations, like the U.S. Centers for Disease Control, state agencies and leading academic institutions, like Columbia University and Dartmouth College. This presentation will touch on factors that appear to affect private well owner opinions and behaviors related to water testing and treatment.

1. **American Academy of Pediatrics (AAP) Recommendations for Private Well Testing (2009)**

The health effects from exposure to groundwater contaminants and the need to increase private well testing and treatment have been a concern of federal, state and environmental health organizations for some time. In 2009, the American Academy of Pediatrics published a policy on private well testing that included important recommendations advocating for policies at the state and local levels that increase well testing and treatment.

These recommendations included increasing state and local government regulation of private wells. For example, upon the sale of homes served by a private well, the AAP recommended that states should require testing of private well water for contaminants of local concern as well as coliforms, nitrate and fluoride. The results should be accessible to the buyer to inform them of any contaminants prior to purchase.

Local governments should provide support to homeowners who wish to test their wells. Information about local groundwater conditions, state recommended testing for private wells and vendors providing water testing services should be promoted by local jurisdictions. Water testing also should be convenient and free or inexpensive, especially in cases where the quality of drinking water poses a threat to the health and safety of those who drink it.

The AAP policy paper further states that pediatricians also have a responsibility to educate families about safe drinking water. Pediatricians should inquire into locations where families or children might drink well water regularly. Families that do, particularly those with infants, should be recommended to test drinking water based on an algorithm developed by AAP.

*For more information, see the full report:*

* <http://pediatrics.aappublications.org/content/123/6/1599.full>

1. **Public Water Systems & Safe Drinking Water Act**

Public water systems are regulated by the EPA.

For public water supplies, defined and regulated under federal and/or state Safe Drinking Water Acts, the United States EPA and authorized state agencies establish and enforce health-based Maximum Contaminant Levels (MCLs) and treatment techniques that establish water quality standards for public water system wells. Other contaminants, not considered to affect public health are considered “secondary” contaminants and have recommended guidelines, Secondary Maximum Contaminant Levels, for drinking water served by public water systems.

Regulations and Guidance:

* Safe Drinking Water Act, 1974, as amended in 1986 and 1996
* Primacy Regulations 40CFR142, Subpart B, 1976, as amended in 1986
* State Programs Priority Guidance (1992)
* Revisions to Primacy Requirements (1998), 63 FR 23362 to be codified at 40CFR142

The bottom line is that private well water quality is not regulated under federal or most state drinking water regulations that apply to public water systems. It is up to the well user to ensure that the water they are drinking is safe.

1. **Domestic (Private) Well Use in United States**

Across the United States, approximately one sixth of U.S. households obtain drinking water from private wells.

1. **Domestic self-supplied population as a percentage of the total state population**

In certain states, such as NH and Maine, nearly 50 percent of the population relies upon private wells as a source of drinking water. A few states have private well testing laws that require testing when property is transferred or rented. These include New Jersey and Rhode Island. Other states, like New Hampshire, have laws that ask sellers to disclose “known” problems with their water supplies, however these laws are difficult to enforce.

While some public and private financial institutions may require a well test during a property purchase, it is not uniformly required in all places and may only cover one or two contaminants.

1. **Arsenic in water from public bedrock wells in New England**

Contaminants can vary by region. Arsenic can be found throughout the United States but it has been found in high frequency throughout the eastern New England region. The eastern part of the region is rapidly growing and developing new private water supplies, in areas where arsenic concentrations are likely to occur at levels greater than the state and federal standard.

Elevated levels of arsenic in bedrock aquifers in New England are primarily naturally occurring. In New England, bladder cancer rates are 29 percent higher than the national average. Arsenic exposure can result in bladder cancer and studies have shown a correlation between consuming water from a private well and increasing bladder cancer rates in the northeast.

It is estimated that 13 million Americans drink water exceeding the 10 ug/L EPA limit.

1. **Model-predicted probabilities of arsenic concentrations in groundwater from bedrock aquifers**

In NH, a significant amount of the state has a high probability of exceeding the 1 and 5 ug / l concentration of arsenic in groundwater. Even low doses of contaminants should be a discussion point for health officials and environmental professionals as the US EPA goal for arsenic is zero or absent from drinking water. Further, current research is now investigating possible health impacts at arsenic concentrations below the current EPA standard of 10 micrograms per liter, or 10 Parts Per Billion.

1. **Low Doses: Manganese and Arsenic**

Low doses of certain contaminants are now being studied to determine their health impacts. For manganese, current research as to the cognitive effects upon children at levels below the drinking water standard are concerning.

**Manganese:** A Canadian study published in 2010 found that the average IQ of children whose tap water was in the upper 20 percent of manganese concentration was 6 points below children whose water contained little or no manganese. The analyses of the association between manganese in tap water and children's IQ took into account various factors such as family income, maternal intelligence, maternal education, and the presence of other metals in the water. For co-author Donna Mergler, "This is a very marked effect; few environmental contaminants have shown such a strong correlation with intellectual ability." The authors state that manganese present in food is not easily absorbed through the digestive system and shows no relationship to the children's IQ.

*For more information:*

* <http://www.sciencedaily.com/releases/2010/09/100920074013.htm>

**Arsenic:** Researchers studied 272 children in grades 3-5 from three school districts in Maine that serve regions known to have high arsenic concentrations in household wells. Their conclusion: arsenic in drinking water poses a threat to child development. Children exposed to water with arsenic concentrations greater than 5 ug / l showed significantly lower IQ scores compared to children drinking water with arsenic concentrations below 5 ug/ l.

*For more information:*

* <http://www.ehjournal.net/content/13/1/23>
* <http://www.centralmaine.com/2014/04/02/maine_study_shows_possible_link_between_arsenic_in_drinking_water_and_intelligence_/>

Studies are now underway to better understand the connection between low doses of arsenic and manganese and the effects upon health, which include an increased risk for cancers (with respect to arsenic) and impacts to childhood intelligence at levels below the current drinking water standard (with respect to manganese).

1. **Sources, human health benchmarks, and possible health effects of contaminants**

Water can become polluted from both natural and anthropogenic sources, some of which can be harmful to health.

**Fluoride** is considered a secondary contaminant by the EPA. While high doses can cause tooth discoloration and increase the risk of bone fractures in adults, it is not health threatening at the secondary maximum contaminant level (MCL).

Other contaminants pose a more serious risk:

Older homes with lead pipes, faucets, and soldering are at risk for lead contamination. **Lead** can also enter groundwater through natural erosion of mineral deposits. It can cause mental and physical delays in infants and children, as well as kidney problems and high blood pressure in adults.

**Radon** can enter drinking water from the radioactive decay of uranium in aquifers. Radon in drinking water was estimated by the EPA to cause “168 cancer deaths each year: 89% from lung cancer caused by breathing radon released to the indoor air from water and 11% from stomach cancer caused by consuming water containing radon,” according to information provided by EPA (http://water.epa.gov/lawsregs/rulesregs/sdwa/radon/basicinformation.cfm).

1. **Social Dimensions of Private Well Testing: Why Don’t People Test their Water?**

Neglecting to test private wells is a significant issue. Most people assume that their water is safe because they have been drinking it for years and have not experienced any adverse health effects. This assumption is dangerous because many contaminants produce chronic health effects that are unrecognizable for many years.

Poor communication of information also presents a barrier to testing. Often, well users do not know which contaminants may be present in their groundwater and what the consequences of allowing their water to go untested might be.

Unfortunately, testing some contaminants can be expensive for some families. The value of the information gained through testing needs to be better communicated as well.

*For more information, see the poster summarizing the study:*

* <http://conservancy.umn.edu/bitstream/58540/1/poster.pdf>

1. **Well Water Samples, Tuftonboro, NH (2012-2013)**

Voluntary testing may be successfully initiated by local health or environmental officials. In the case of Tuftonboro, NH, the testing events were well publicized by local environmental volunteers and very successful in part due to the coordinated local and state efforts to provide information in a concerted way through a trusted local coalition.

1. **Speak with homeowners about the importance of testing!**

Well water should be tested every 3 to 5 years for common contaminants; however, certain contaminants should be tested annually, like total coliform (bacteria) or nitrates and nitrites as they can occur more rapidly with land use changes. The EPA recommends annual testing for total coliform bacteria, nitrates, total dissolved solids, and pH levels.

The EPA also recommends testing whenever a well is replaced or repaired and when activities within the watershed containing the well pose threats to groundwater quality. Major changes in land use can compromise well water quality as well.

Finally, well users that notice any changes in water taste, odor, color or clarity should their test water.

*Information on recommendations provided by EPA can be found at the following webpages:*

* <http://water.epa.gov/drink/info/well/upload/2003_06_03_privatewells_pdfs_household_wells.pdf>
* <http://water.epa.gov/drink/info/well/>

1. **Recommended Tests for Private Wells**

States, like New Hampshire, have a discrete set of recommended water tests for private wells, as listed in this slide. New Hampshire has calculated the expected frequency of exceeding the MCL for specific contaminants in well water. When speaking with private well owners, it is important to express that common contaminants, like arsenic, can exist within groundwater.

1. **Testing Is Easy**

Explain to your clients how testing works. Samples can be collected by the homeowner and tested by state accredited laboratories. County health departments will often test for bacteria and nitrates but many do not have the capacity to test for other contaminants.

The lab should be contacted before samples are collected to ensure sampling is done properly so that the testing yields accurate results. Storage instructions will differ based on the contaminant being tested.

1. **Water treatment**

Once water is tested, it may require treatment to remove or reduce contaminants to a safe level (the MCL) set by EPA. Treatment decisions can be difficult for well owners to make, so often states publish guidance on how to effectively treat and remove contaminants in well water. Unfortunately, there are obstacles to treating private well water effectively, including finding and installing an effective treatment technology, cost, and understanding the requirements of maintaining the treatment system. Resources are available and are becoming more prominent online to address some of these issues.

1. **Hand out resources and educational materials**

Create a packet of resources that can be easily handed to well users to help them navigate state and national sources of information. We’ll cover where more information can be found.

1. **National tools and resources for well owners**

*Consult Tools and Resources handout for more detail.*

A few online tools and many published resources are available to provide additional information and guidance on testing and treating drinking water from private wells. Get to know these resources as well as others that may be provided by your state.

The U.S. Centers for Disease Control and Prevention is an excellent resource for basic information on private drinking water wells. The webpage directory contains links to the basics of drinking water wells, proper location of wells, possible contaminants and health risks, suggested maintenance, and emergency treatment.

For state-specific private well information or certified laboratories, the EPA has created directories with links to state government websites.

The tools and resources provided in this training are national resources. State health departments or state drinking water programs can be invaluable resources for understanding test results or answering questions about private wells.

1. **Water Quality Interpretation Tool**

A great resource to show clients is the Water Quality Interpretation Tool developed by Colorado State University, with collaboration from western U.S. land grant universities, to evaluate laboratory water testing results. The tool can be used to interpret results of tests conducted throughout the United States, but specializes in interpreting samples collected in Colorado, Montana, North Dakota, South Dakota, Oklahoma, Utah, and Wyoming. The webpage also provides drinking water resources and contaminant fact sheets. New Hampshire is currently underway to develop a more sophisticated water treatment web tool to ensure the proper technologies are selected by private well owners, in conjunction with their water treatment vendors.

1. **Look for State-Offered Guidance**

Check out resources offered by your own state to print out and provide to clients. Many states provide some form of water testing guidance to private well users. Some states have developed their drinking water program websites to provide easy access to tools and publications with state specific information on maintaining quality of drinking water from private wells. Often university-based programs, like Cooperative Extension Offices, offer private well guidance and information. Residents can also call their state environmental laboratory accreditation program for information on certified water testing labs or the state health department to find out if testing assistance is available or if free testing is provided.

Maine has developed a website to provide easy access to information and data on private well water. Visit either health or environmental agency websites in your state to find resources that may be downloaded that you can use to assist your clients to test and treat their well water.

1. **Financial Assistance**

Surveys indicate that those of lower income, perhaps those who rent property, may test and treat their well water at lower rates, increasing their risk of exposure to harmful contaminants. Federal assistance through the USDA 504 Program under the agency’s Rural Development Office is one source of funding that may be available to treat and remove contaminants in drinking water provided by private wells. See the link in the provided resources document to find the office in your state.

1. **Final Thoughts on Well Water Testing**

To recap what this training has covered:

Unsafe levels of contaminants can be found in drinking water wells throughout the US and have the potential to cause serious health impacts. Research has shown that consuming certain contaminants early in life can lead to chronic health effects and diseases that surface in adulthood. Research also continues to explore the health impacts associated with contaminants in drinking water below the current health based standards or guidelines set by EPA.

Well users can protect themselves from harmful contaminants by testing water annually for bacteria and nitrates. Every 3-5 years well owners should test for contaminants of concern as identified by state or county health or environmental agencies. Water treatment should, at a minimum, remove contaminants to levels below the maximum contaminant level (MCL) for contaminants that have human health impacts as determined by the EPA.

Even though there are clear health risks, most well users do not test their water regularly and some do not test at all. It is important to advise well users of the potential consequences of not testing well water and make them aware of the resources and information available to assist them with the testing and treatment process. With your help, we can minimize exposure to contaminants and possible health impacts.