



# Benton County Health Department

## Environmental Health

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Person-Centered Behavioral & Physical Health Care   Public Health & Prevention   Regulatory and Population Health   Health Management Services

Date: 4/10/2017

To: **House Committee on Energy and Environment**

From: Bill Emminger, REHS

Subject: Testimony on HB 2404

From 2014 through 2016 Benton County Environmental Health (BCEH) Domestic Well Safety Program (DWSP) was funded in part by a grant from Oregon Health Authority (OHA). During this three year period 149 private wells were tested. Of those:

- 18.1% tested positive for coliforms
- 0.7% tested positive for *Escherichia coli* (E. coli)
- 21.5% tested positive for some level of arsenic
- 28.8% tested positive for some level of nitrates
- 12.1 % tested positive for more than one contaminant

These results indicate a need for property owners to have full disclosure of testing results at least during a real-estate transaction, and for more routine monitoring by landlords whose properties are served by a private well. See Charts 1 and 2 for more detail analysis of test results.

### How was this data collected?

The BCEH-DWSP worked with 149 property owners who obtained their drinking water from a private well. Wells were tested for arsenic, nitrate, and total coliforms. When a positive total coliform was detected, an additional test for *Escherichia coli* (E.coli) was performed. Program participants received: free well water testing, an exterior well inspection, analysis of set-backs to septic drain field and septic tanks, identification of any hazards in the immediate vicinity of the well, a review of Oregon Water Resources' website for well logs/records associated with the homeowners' property, administration of a demographic survey, a resource packet (containing educational materials about

health hazards associated with tested contaminants, discounted voucher for future water testing, local resources, and well safety information), and a letter summarizing test results and recommendations. Samples were collected by paid environmental health staff or unpaid interns and chain of custody was maintained on every sample to the testing laboratory to assure the integrity of the samples.

The well inspection analyzed several factors that could influence contamination risks and well water safety, including: improper well construction, likelihood of flooding, set-backs to septic system and drain field, and hazardous chemicals in the vicinity of the well. Well water testing for arsenic and total coliform was performed by Edge Analytical Laboratory which is a state certified drinking water laboratory. Edge Analytical Laboratory provided testing at a reduced cost and Oregon State University Extension Service (OSU Ext. Service) provided free testing for nitrate.

**Results:**

**Chart 1:** The following chart shows number and percentage of samples that exceeded the Environmental Protection Agency standards for safe drinking water.

<b>Test Performed</b>	<b>Number of Positive Test or Exceeded Maximum Contamination Level (MCL)</b>	<b>Percent</b>	<b>Estimate of home served by a private well that exceed safe drinking water standards. Estimate is based on a population size of 10,000 homes</b>
Coliform	27	18.1% (27/149)	1,812
E. coli	1	0.7% (1/149)	67
Arsenic >0.010 ppm	5	3.4% (5/149)	336
Nitrate >10 ppm	6	4.0% (6/149)	403

**Chart 2:** The following chart shows all number and percentage of results detected. It includes results both below and above Maximum Contamination Level (MCL).

Test Performed	Number of Positive Test or Exceeded MCL	Percent
Coliform	27	18.1% (27/149)
E. coli	1	0.7% (1/149)
Arsenic 0.001-<0.010 ppm	27	18.1% (27/149)
Arsenic $\geq$ 0.010 ppm	5	3.4% (5/149)
Arsenic Total	32	21.5% (32/149)
Nitrate 0.5 to < 10 ppm	37	24.8% (37/149)
Nitrate $\geq$ 10 ppm	6	4.0% (6/149)
Nitrate Total	43	28.8% (43/149)
Wells that tested positive for more than one contaminate	18	12.1% (18/149)

**Coliforms:** Positive (+) test result for coliforms is not a significant health concern. Its presence may be the result of a sample collection error, the result of biofilms in water line or well, or it may indicate a more serious problem such as a cracked well head or seal that if not corrected could create a significant health concern.

**E. coli:** Positive (+) test result for E. coli may mean that the sample was contaminated during collection, surface water has contaminated the well, or E. coli has contaminated the ground water aquifer from another source. E. coli is an indicator organism that may indicate that the water supply may have been contaminated by human disease causing organisms.

**Arsenic:**  $\geq$ 0.010 ppm for Arsenic means that the level of arsenic has exceeded the Maximum Contamination Level (MCL ) of 0.010 ppm set by the Environmental Protection Agency (EPA) for public drinking water systems. Domestic wells are not regulated by the government and have no set standards. However, the MCL set for public water systems is a very reliable health base standard for domestic wells.

**Nitrate:**  $\geq$ 10 ppm for Nitrate means a high level of nitrate that exceeds public drinking water standards. The source of nitrate is most likely caused by human influence either by septic effluent, home or agricultural application of fertilizer, or the presence of large amounts of animal waste. Domestic wells are not regulated by the government and

have no set standards. However, the MCL set for public water systems is a very reliable health base standard for domestic wells.

### **Health Impacts:**

Testing of domestic wells will help to avoid acute and chronic health conditions in Oregonians who get their drinking water from private wells.

### **Bacteria and Viruses:**

Testing for coliforms and E. coli will help to alert private well owners to the potential presence of bacteria and viruses that can cause gastrointestinal illness. Often these illnesses can range from mild to severe. In infants, the elderly or persons with compromised immune systems some of these illnesses could result in chronic health problems or even death.

### **Arsenic**

Long-term consumption of water with arsenic above the drinking water standard may increase the risk of health problems of the skin, circulatory system, nervous system, lungs and bladder. These health problems include some forms of cancer.<sup>1</sup>

### **Nitrate:**

Nitrate levels above 10 ppm may present a serious health concern for infants and pregnant or nursing women. Adults receive more nitrate exposure from food than from water. Infants, however, receive the greatest exposure from drinking water because most of their food is in liquid form. This is especially true for bottle-fed infants whose formula is reconstituted with drinking water with high nitrate concentrations. Nitrate can interfere with the ability of the blood to carry oxygen to vital tissues of the body in infants of six months old or younger. The resulting illness is called methemoglobinemia, or "blue baby syndrome".

Pregnant women may be less able to tolerate nitrate, and nitrate in the milk of nursing mothers may affect infants directly. These persons should not consume water containing more than 10 ppm nitrate directly, added to food products, or beverages (especially in baby formula).

Little is known about the long-term effects of drinking water with elevated nitrate levels. Some research has suggested that nitrate may play a role in spontaneous miscarriages, thyroid disorders, birth defects, and in the development of some cancers in adults. Recent human epidemiologic studies have shown that nitrate ingestion may be linked to gastric or bladder cancer. The most likely mechanism for human cancer related to nitrate is the body's formation of N-nitroso compounds (NOC), which have

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<sup>1</sup> Oregon Health Authority, Arsenic in well water: What you should know. March 2016

been shown to cause tumors at multiple organ sites in every animal species tested, including neurological system cancers following transplacental exposure. Nitrite, the reduced form of nitrate, reacts in the acidic stomach to form nitrosating agents that then react with certain compounds from protein or other sources such as medications to form NOCs. In humans, it is the nitrosamines and NOCs that are suspected brain and central nervous system carcinogens. Additional epidemiologic and research studies are needed to verify these links and identify any other potential nitrate-related cancer risks. Links to supporting information are provided at the end of this document.

One associated human health concern is that water supplies showing nitrate contamination have the potential for other contaminants, such as bacteria and pesticides, to reach groundwater along with the nitrate. In a 2009 report on the quality of water in domestic wells, the U.S. Geological Survey found that contaminants such as nitrate (nutrients) co-occurred with other contaminants in 73 percent of wells tested in the study. <sup>2</sup>

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<sup>2</sup> Oregon Department of Environmental Quality Fact Sheet on Nitrate in Drinking Water. February 2014.