Private Wells in NH

• Key Messages:

• Regulation of private wells is left to states and towns

• NH has no statewide requirements to test/treat private well water

• Test, and if necessary treat your drinking water so it is safe for consumption
36-40% of NH homes obtain drinking water from private wells
<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Type</th>
<th>Human-health benchmark</th>
<th>Potential health effects from exposure above benchmark</th>
<th>Source of contaminant in drinking water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>Trace element</td>
<td>10 µg/L MCL</td>
<td>Increased risk of several cancers; circulatory problems; endocrine disruption</td>
<td>Erosion of natural deposits; runoff from historic pesticide or insecticide application; some industrial waste</td>
</tr>
<tr>
<td>Lead</td>
<td>Trace element / Heavy metal</td>
<td>15 µg/L EPA Action Level</td>
<td>Developmental delays; children could show slight deficits in attention span and learning abilities Adults: Kidney problems; high blood pressure</td>
<td>Corrosion of household plumbing; erosion of natural deposits</td>
</tr>
<tr>
<td>Radon</td>
<td>Radionuclide</td>
<td>4,000 pCi/L EPA Action Level</td>
<td>Increased risk of lung cancer for radon in air; slight increase in risk of stomach cancer for radon in water</td>
<td>Radioactive decay of uranium in aquifer; building materials</td>
</tr>
<tr>
<td>Manganese</td>
<td>Trace element</td>
<td>300 pCi/L EPA Proposed MCL</td>
<td>Neurological effects; manganism</td>
<td>Soil; aquifers; gasoline</td>
</tr>
<tr>
<td>Uranium</td>
<td>Trace element</td>
<td>300 µg/L USGS HBSL</td>
<td>Increased risk of cancer; kidney toxicity</td>
<td>Aquifers</td>
</tr>
<tr>
<td>Nitrate/Nitrite</td>
<td>Organic/Inorganic Compounds</td>
<td>10 mg/L MCL</td>
<td>Shortness of breath; blue baby syndrome; Methemoglobinemia</td>
<td>Fertilizer use; manure; sewage and septic-system effluent; aquifer materials</td>
</tr>
<tr>
<td>E. coli; Legionella; Giardia; Cryptosporidium</td>
<td>Microorganisms</td>
<td>Goal: zero</td>
<td>Gastrointestinal illness (diarrhea; vomiting; cramps); Legionnaire's Disease</td>
<td>Human and animal fecal waste; some are naturally present</td>
</tr>
<tr>
<td>MtBE</td>
<td>Fuel oxygenate</td>
<td>13 µg/L NH DES Health-based</td>
<td>Possible carcinogen; not well studied, but stomach irritation, liver and kidney damage in animals</td>
<td>Leaking storage tanks and pipelines; gasoline spills; air deposition</td>
</tr>
</tbody>
</table>
What is arsenic?

- Colorless, odorless, and tasteless chemical element
- A metalloid
- As is present naturally and as a result of human activities
- Industrial use is declining, but used historically as a:
  - Agricultural insecticide and herbicide
  - Feed additive
  - Wood preservative (phased out)
Arsenic in drinking water = a global public health issue

- Worldwide, an estimated 250 million to 1 billion people are affected by excess arsenic in groundwater.

- A WHO program of digging tube wells in India and Bangladesh to alleviate cholera problem led to exposure to excess arsenic in drinking water.

- Highly contaminated areas (India, South America) can contain as much as 1800 ppb (180 times the WHO standard).
Approximately **one in five NH wells have arsenic in excess of the federal drinking water standard**, meaning 10% of the state’s population (~120,000 people) could be chronically exposed to high levels of arsenic.

New Hampshire “The Arsenic State”
(data from C. Page Chamberlain et al., unpublished)
Model-predicted probabilities of arsenic concentrations in groundwater from bedrock aquifers at 5 PPB.
Arsenic in drinking water: possible health effects

- Studies link exposure to arsenic in drinking water to a wide variety of adverse health effects:
  - 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

Arsenic and lung disease

- Arsenic exposure is associated with increased risk of:
  - Lung Cancer
  - Bronchiectasis
  - Chronic Obstructive Pulmonary Disease (COPD)
  - Emphysema
  - Chronic Lung Infections

- Arsenic is unique in increasing lung disease risk via ingestion rather than (or in addition to) inhalation

- Arsenic synergistically increases risk of lung disease from other lung toxicants including tobacco smoke, environmental air contaminants, bacterial and viral infections
Arsenic and bladder cancer

• There is a causal relationship between chronic ingestion of inorganic arsenic in drinking water and bladder cancer when levels are relatively high (≥ 150 µg/L).

• Cancer risk associated with lifetime ingestion of 10 µg/L is much higher than it is for other MCLs.
U.S. age-adjusted incidence rate: 20.8 per 100,000 from 2005-2009
(National Cancer Institute)
Characteristics of arsenic that affect risk perception

• No perceptual cues or reminders of presence of risk – colorless, odorless, tasteless

• Risk is generally natural; no villain to assign responsibility or blame

• Experience with risk is generally benign – may have lived in homes many years without any known health issues

• Deaths due to the risk are not dramatic, occur singly and impossible to unequivocally relate to the risk

• Exposure to the risk is voluntary in the sense that people choose where they want to live and which home to buy

• Effect of the risk is far removed from initial exposure (cancer takes many years to develop)

• Risk is not the same for everyone but varies in complex ways depending on several dimensions (geographic location, soil type, house structure, occupant behavior)

• Probability of the risk low in comparison to other activities (e.g., driving)
Contact Info

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