

# Arsenic in Groundwater and Health Implications

*Presented by:*

**Brian Toal, M.S.P.H.**

**Supervising Epidemiologist IV**

**State of Connecticut**

**Department of Public Health**



# Arsenic (As)

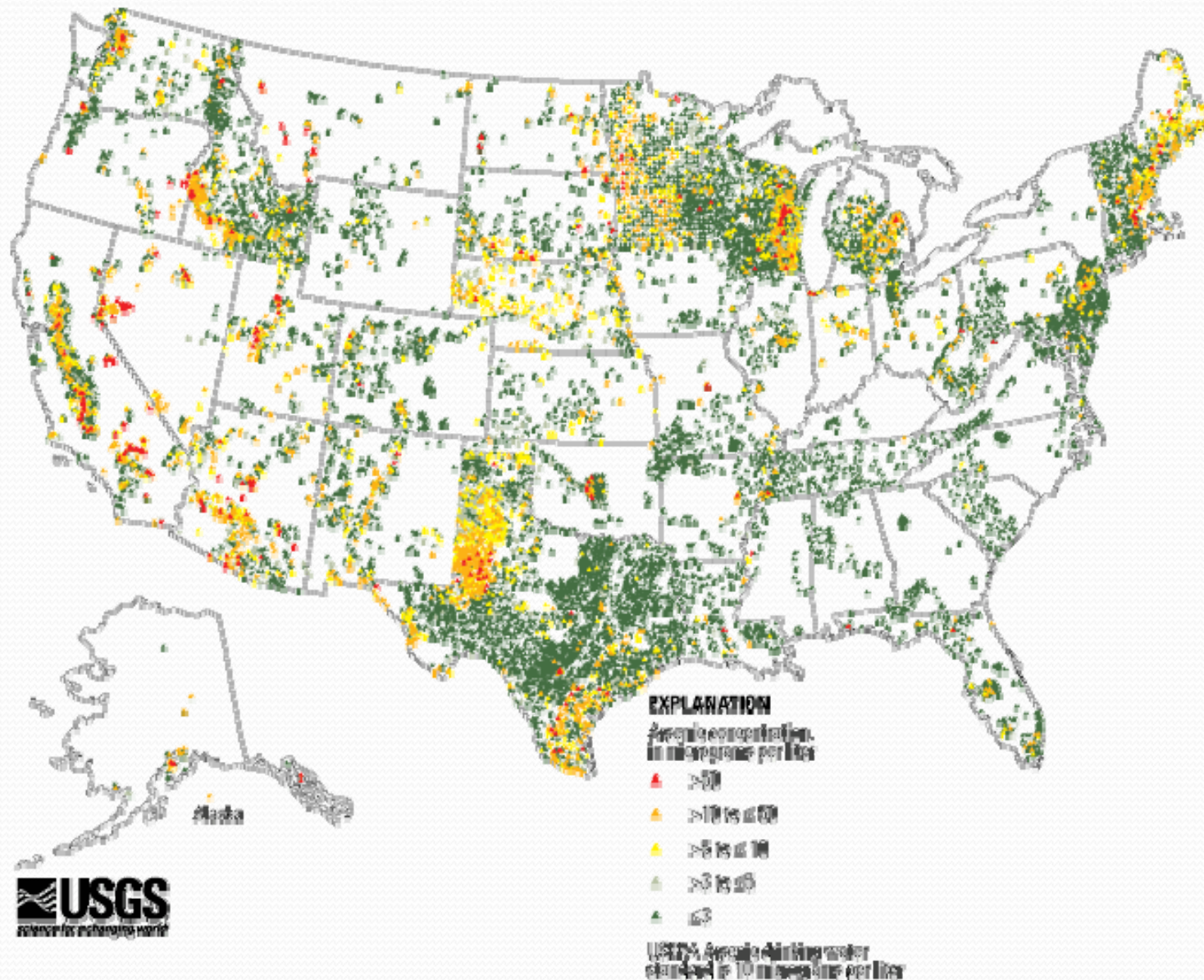
- **Naturally occurring metal**
- **Found in soil, bedrock, groundwater, surface water, air, food**
- **Odorless and tasteless**
- **Found in organic and nonorganic forms**
- **Used in industry, farming, pressure treated wood**



# Arsenic in Groundwater

- Found worldwide, famously in Bangladesh (62% >10 ppb – Max. = 3,700 ppb)
- Average 1-2 ppb or micrograms per liter
- 10% of wells in New Hampshire greater than federal standard – 10 ppb
- Some levels up to 200 ppb
- CT data not easily available, levels up to 40 ppb in N.E. CT

# Arsenic in United States Groundwater



# As Exposures

- **Diet is largest source 10-50  $\mu\text{g}/\text{day}$**
- **Most of that is less toxic organic arsenic (60%)**
- **Seafood is big source – almost all organic**
- **Drinking Water up to 5  $\mu\text{g}/\text{day}$  average**
- **Soil and air contribute less**
- **Children may get more from soil and decks**

# As Health Effects - #1

- **As is a human carcinogen: bladder, lung, skin**
- **Non-cancer effects – skin, heart, immune, nervous system, GI system**
- **These effects are chronic, take many years to develop**



## **As Health Effects - #2**

- **Acute As poisoning not likely to occur at levels found in well water**
- **Effects depend on dose and duration time**
- **Human cancer seen at levels over 150 ppb**
- **May affect brain development in utero exposure and during childhood**



# Medical Testing for As

- **Not generally recommended**
- **Unreliable and hard to interpret**
- **Background levels in all of us**
- **No medical use – will not direct treatment**
- **Simplest answer is to test drinking water**





# Testing for As In Water

- **Certified labs on DPH Web Site**
- **Compare to federal standard of 10 ppb**
- **Once every 5 years**

# Treatment for As

- **Many good options – consult well treatment specialist**
- **No single device for all wells – depends on water chemistry**
- **Reverse Osmosis, metal oxide filters, ion exchange systems**
- **National Sanitation Foundation**
- **Can treat at point of use – kitchen tap, little absorption in showering and bathing**