

How the Department of Health Services Addresses Water Quality Issues

Jon Meiman, MD

Chief Medical Officer and State
Occupational and Environmental
Disease Epidemiologist

Roy Irving, PhD

Hazard Assessment Section Chief

Wisconsin Department of Health Services

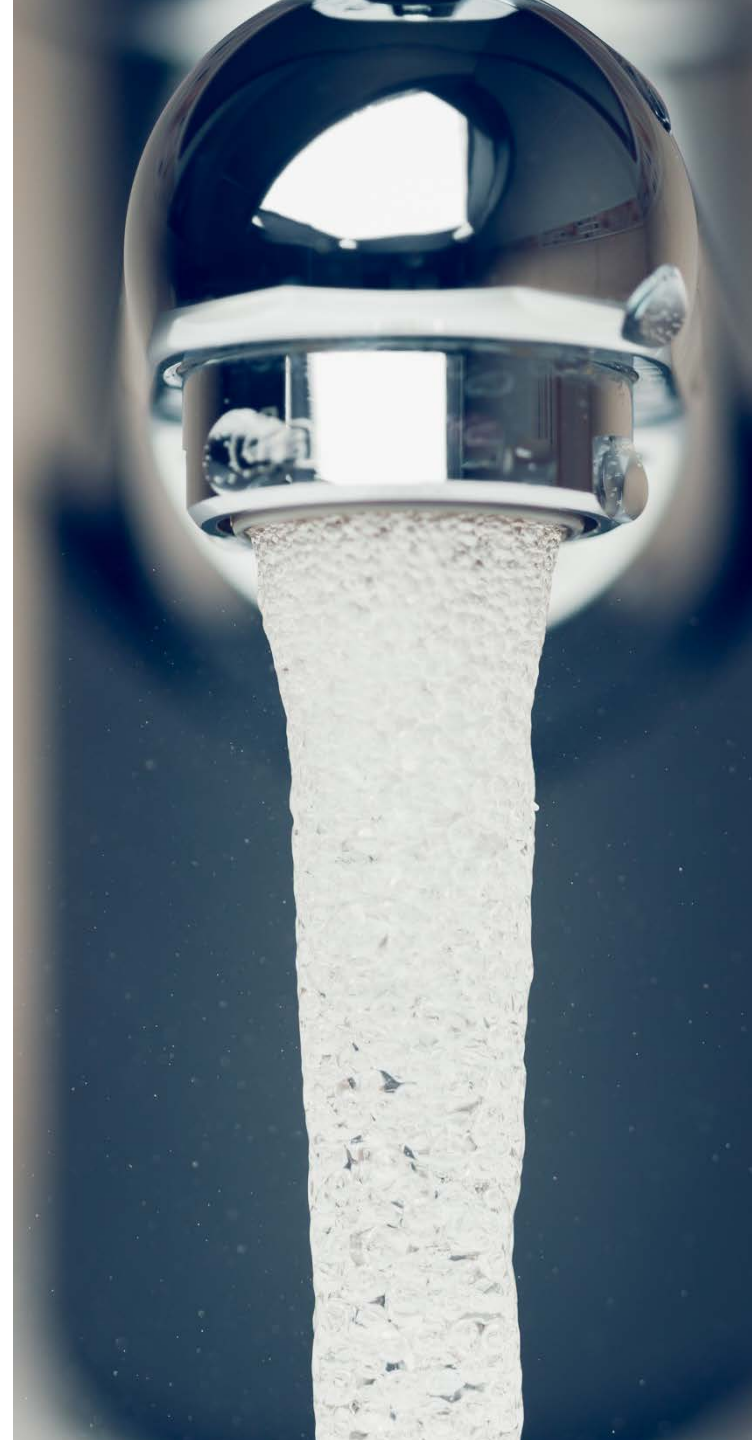
Division of Public Health

March 20, 2019



Overview

- DHS's role in addressing water quality issues
- Health risk assessment concepts
- Health implications of prominent water contaminants
- Current effort to develop recommended groundwater standards





DHS's role in addressing water quality issues

DHS Water Quality Programs



Groundwater Standards
Development



Site Evaluation



Harmful Algal Bloom
Surveillance



Environmental Public
Health Tracking



Communicable Disease
Epidemiology

DHS Water Quality Programs



Climate and Health



Oral Health



Childhood Lead Poisoning
Prevention



Radiation Emergency Unit

DHS Water Quality Activities

- Groundwater standards recommendations
- Standards for radioactivity in community water systems
- Health assessment and illness investigations
- Biomonitoring and disease surveillance
- Environmental monitoring around nuclear power plants
- Administering fee-exempt testing service through partnership with WSLH and DNR

DHS Water Quality Activities

- Public health emergency response to chemical, natural, and radiological disasters
- Health education and outreach
 - Public meetings
 - General outreach
 - Consultation with the public about their water quality concerns
- Community water fluoridation

DHS Collaborative Partners

- Local public health agencies (LPHAs)
- Tribal health departments
- State agencies (e.g. DNR, DATCP, DSPS, Wisconsin State Laboratory of Hygiene)
- Federal Agencies (e.g. EPA, ATSDR, CDC)
- UW System
- Professional organizations



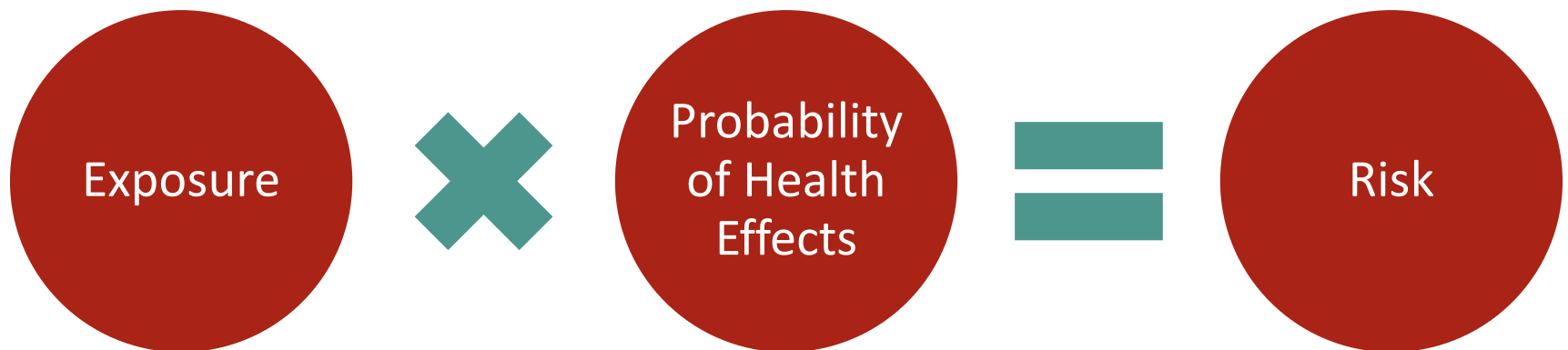


Basic Health Risk Assessment Concepts

What do we mean by “health risk assessment”?

Determination of the relationship between the magnitude of exposure to environmental hazards and the probability of occurrence of adverse health effects.

-Wis. Stat. 254.02 (1) (b)



Questions to understand exposure

- What substances are present in the water?
- Where are the substances coming from?
- What are the concentrations of those substances?
- Who could be exposed?

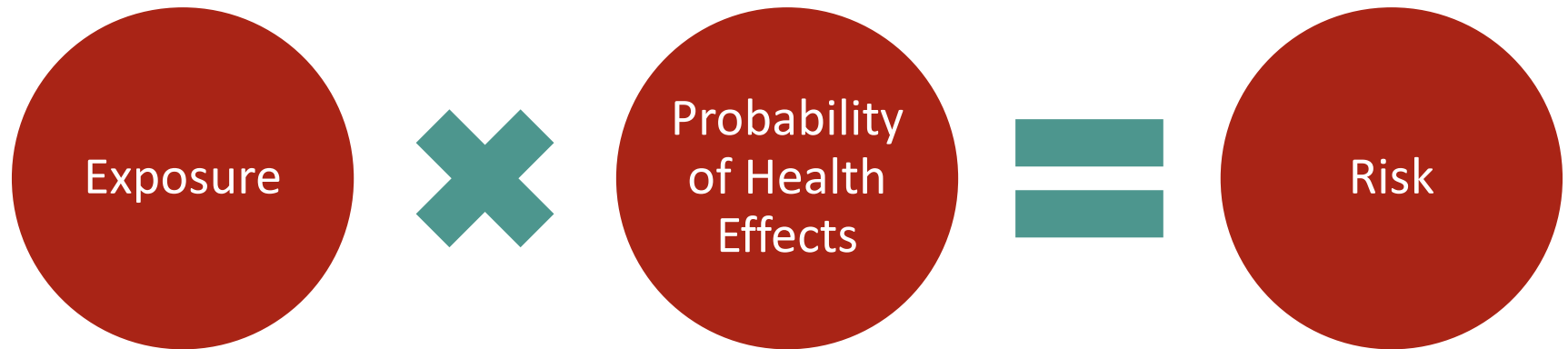


Questions to understand potential health effects

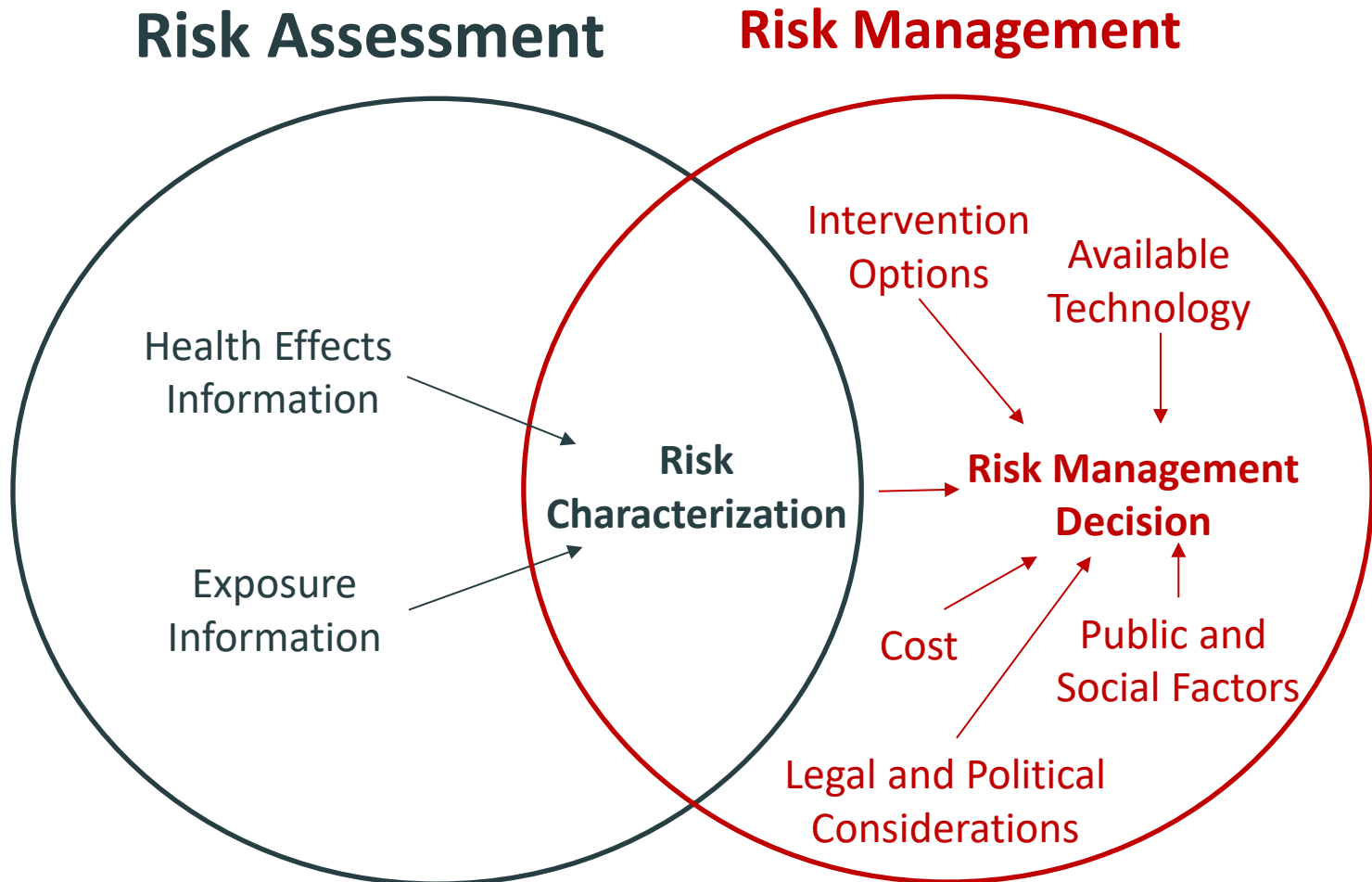
- Can the contaminant cause negative health effects?
- What are these health effects?
- Who is susceptible?
- What duration of exposure (short-term vs. long-term) could lead to these health effects?
- What concentration of the contaminant is associated with these health effects?



Characterizing Risk



Risk assessment \neq Risk management



Summary

- Health risk assessment informs risk management decisions.
- Health risk assessment synthesizes information on exposure (occurrence) and health information.
- Ensuring a good understanding of the occurrence of environmental contaminants and their potential health effects is critical.



Health implications of prominent water contaminants

- Bacteria
- Nitrates
- Lead
- Arsenic
- Emerging Contaminants

Bacteria in Drinking Water

- Contamination can be caused by:
 - Poor sanitary practices during well construction.
 - Defects in well or plumbing system.
 - Presence of nearby contamination sources.
- Coliform bacteria and *E. coli* are common indicators used to detect bacterial contamination.
- Viruses and other pathogens in groundwater are an emerging concern.



Bacteria
Nitrates
Lead
Arsenic
Emerging

Health Risks

- If bacteria are present, water can pose an immediate health risk to everyone.
 - Young children, the elderly, and people with weakened immune systems may be at greater risk.
- Common symptoms of illness include diarrhea, nausea, vomiting, cramps, or fever.

DHS Activities

- Public health education
- Technical assistance and health education support to partners agencies
- Administration of fee-exempt bacteria testing through the State Lab
 - Partnership with the State Lab, DNR, and LPHAs
- Reviewing literature on public health interpretation of microbial source tracking data results

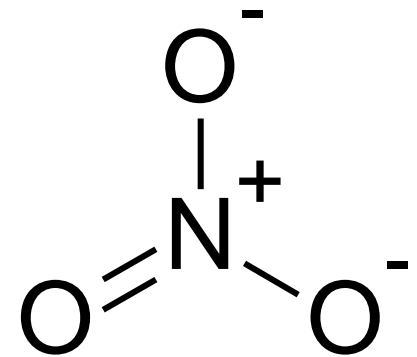
Recommendations for Bacteria

- Explore methods to maintain adequate and stable levels of support for applied groundwater research.
- Consider prioritizing projects addressing public health assessment and communication challenges associated with interpretation of data from microbial source tracking techniques.

Nitrates in Drinking Water

- Naturally-occurring anion
- Found in many foods
- Can enter groundwater from fertilizers (agricultural and residential) as well as septic systems.
- Nitrate contamination of groundwater is increasing in extent and severity in the state.


Bacteria
Nitrates
Lead
Arsenic
Emerging



Nitrate

Health Risks

- High levels pose a serious short-term health risk to infants, pregnant women, and females who may become pregnant.
- High levels of nitrate can affect the health of everyone.



Bacteria
Nitrates
Lead
Arsenic
Emerging

DHS Activities

Bacteria
Nitrates
Lead
Arsenic
Emerging

- Technical support for LPHAs working on jurisdiction-specific activities
- Coordination of partners to ensure consistent health advisory language
- Administration of fee-exempt nitrate testing through the State Lab
- Refinement of disease surveillance protocols for methemoglobinemia

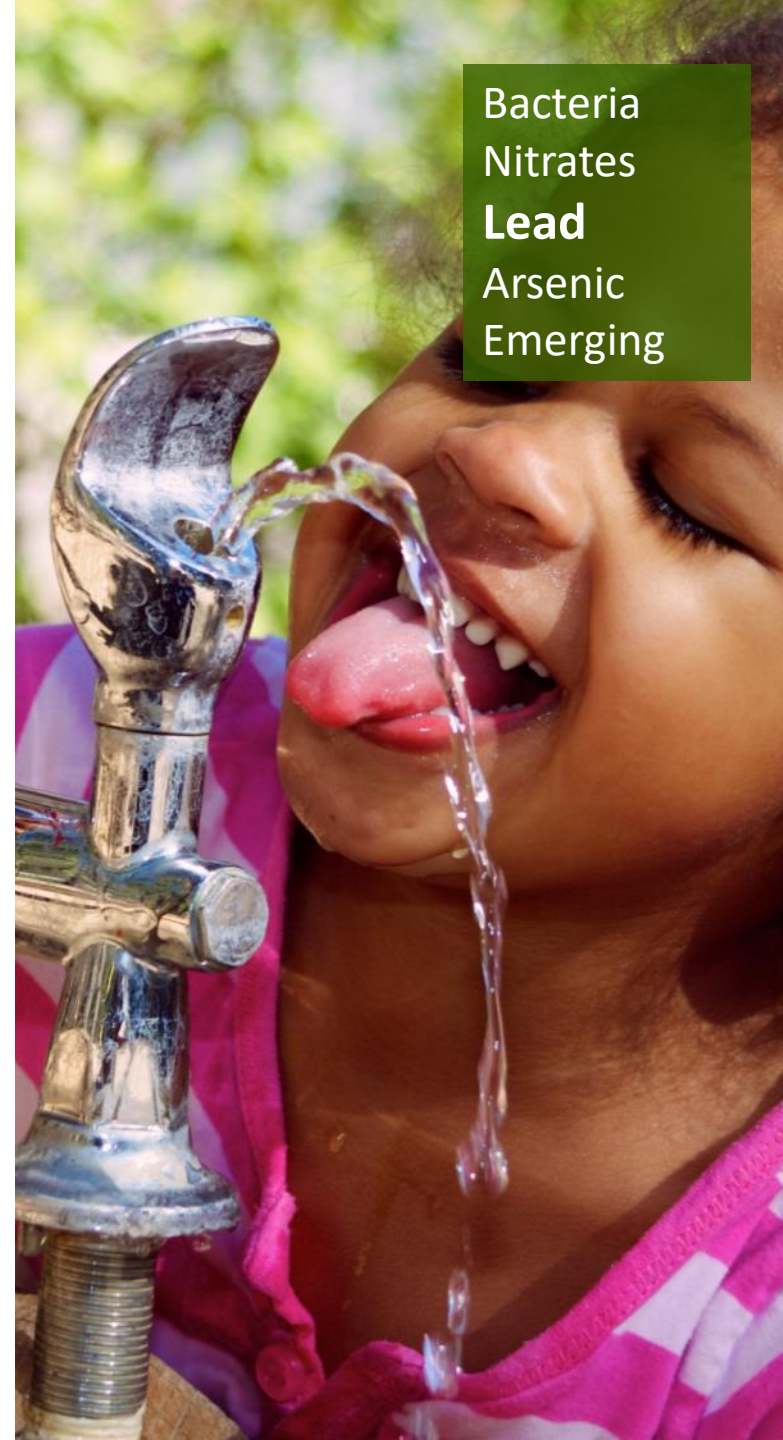
Recommendations for Nitrates

Bacteria
Nitrates
Lead
Arsenic
Emerging

- Improve alignment of funding and eligibility criteria of Well Compensation Program with current knowledge of groundwater-related health risks.
- Explore and promote innovative management strategies to reduce nitrate contamination of groundwater.

Lead in Drinking Water

- Lead-based paint is the primary source of lead exposure.
- 10-20% of lead exposure comes from water, but it could be higher for certain groups.
- Under federal requirements, water systems test for lead in a *subset* of high risk homes.



Bacteria
Nitrates
Lead
Arsenic
Emerging

Health Risks

Bacteria
Nitrates
Lead
Arsenic
Emerging

- No safe level of lead in blood has been identified.
- Everyone can be affected by lead, but pregnant women and children less than 6 years old are most at risk.
- Lead exposure in children can have permanent effects.

DHS Activities

Bacteria
Nitrates
Lead
Arsenic
Emerging

- Support LPHAs with jurisdiction-specific projects
- Enhance LPHA capacity to be engaged on this topic
- Provide guidance to LPHA staff on lead risk assessment
- Administration of fee-exempt metals testing through the State Lab

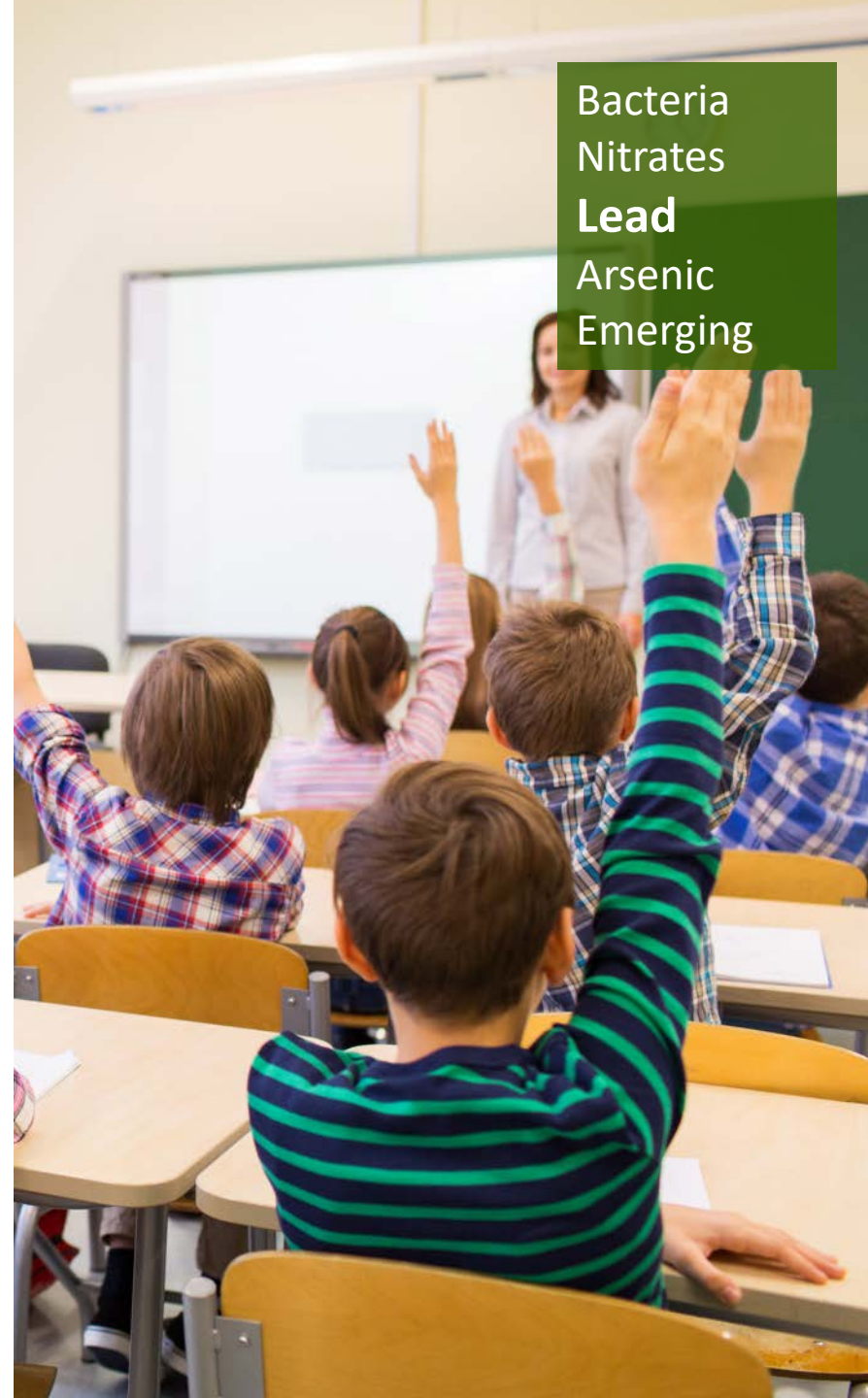
DHS Activities

Bacteria
Nitrates
Lead
Arsenic
Emerging

- Consultation to prospective child care providers on environmental health concerns
- Application for EPA grant for lead water testing in schools and/or child care facilities
- Drafting framework to guide individuals on assessing and reducing lead in drinking water risks.

Recommendations for Lead in Water

Ensure adequate
support for lead testing
in schools and child care
facilities



Bacteria
Nitrates
Lead
Arsenic
Emerging

Arsenic in Drinking Water

- Naturally occurring element that can be found in rocks, minerals, and ores
- Found in some types of old pesticides, treated wood, and certain foods
- Has been detected in the groundwater of every county in Wisconsin



Bacteria
Nitrates
Lead
Arsenic
Emerging

Health Risks

- Consumption of high levels of arsenic in water is associated with effects on:
 - Skin
 - Cardiovascular system
 - Gastrointestinal system
- Arsenic is classified as a known human carcinogen.
- Infants and young children may be especially sensitive to arsenic.
- Studies suggest some risk from arsenic exposure in pregnant women and developing fetuses.

DHS Activities

- Support LPHAs with jurisdiction-specific projects
- Enhance LPHA capacity to be engaged on this topic
- Administration of fee-exempt arsenic testing through the State Lab

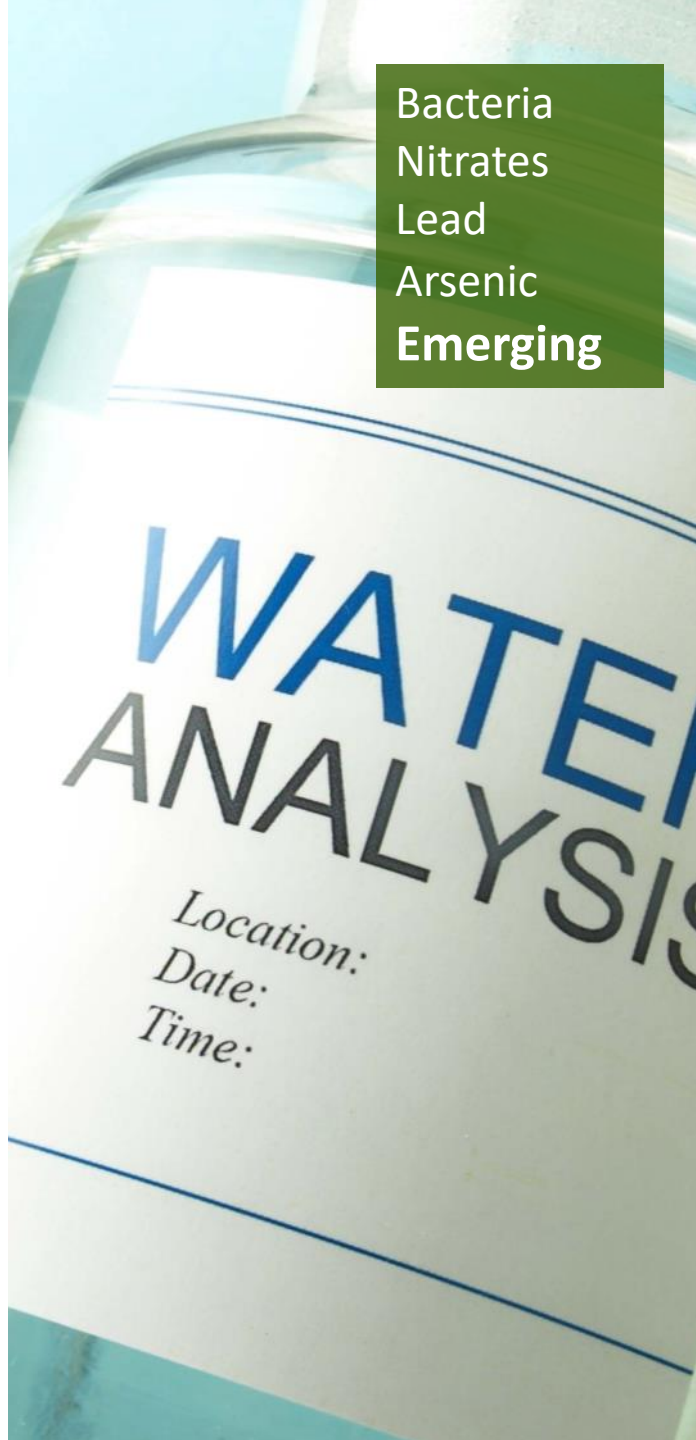
Recommendations for Arsenic

Bacteria
Nitrates
Lead
Arsenic
Emerging

Support state and local agency community engagement efforts about arsenic and the importance of well testing

Emerging Contaminants

- Substances with increasing evidence that they:
 - Are in the environment
 - May cause harmful effects to people or the environment.
- Often, scientific understanding of occurrence and health effects is evolving for these substances.
- Health risks vary among substances, even within families of related compounds.



Bacteria
Nitrates
Lead
Arsenic
Emerging

Per- and polyfluoroalkyl substances (PFAS)

Bacteria
Nitrates
Lead
Arsenic
Emerging

- PFOA and PFOS are the most prevalent and well studied PFAS.
- Scientists are still learning about the health effects of various PFAS on the human body.
- Research suggests that high levels of certain PFAS may affect cholesterol levels, the immune system, the thyroid, the reproductive system, and birth weight.

Bacteria

Nitrates

Lead

Arsenic

Emerging

Neo-nicotinoid pesticides

- Class of pesticides used to control a variety of indoor and outdoor insects.
- Similar to nicotine in structure
- Designed to act on insect nicotine receptors resulting paralysis and death
- Specific health effects and toxicity varies among these substances

DHS Activities

Bacteria
Nitrates
Lead
Arsenic
Emerging

- Technical support for state agency partners and LPHAs responding to situations of environmental contamination
- DHS is currently supporting the following known instances:
 - PFAS in Marinette and Madison
 - Private well contamination with pesticides in Central Wisconsin
- Current groundwater standard setting project includes 2 PFAS and 3 neo-nicotinoid pesticides

Recommendations for Emerging Contaminants

Bacteria
Nitrates
Lead
Arsenic
Emerging

Support implementation of a state water quality monitoring strategy to assess for the occurrence of emerging contaminants



DHS' role in providing state groundwater standard recommendations

Groundwater standard setting process

- Described in Wisconsin Statute Ch. 160, Wis. Stats.
- Collaborative process between DNR and DHS
- DHS develops recommendations for public health enforcement standards
- DHS scientists review technical information from federal government, other agencies and the scientific literature



DHS is currently reviewing 27 substances for new or revised recommended standards.

- Aluminum
- Bacteria (E. coli)
- Bacteria (total coliform)
- Barium
- Boron
- Chromium, Hexavalent
- Clothianidin
- Cobalt
- Dacthal TPA & MTP degradates
- 1,1-Dichloroethane (1,1-DCA)
- 1,4-Dioxane
- Glyphosate
- Glyphosate AMPA degradate
- Imidacloprid
- Isoxaflutole
- Isoxaflutole BA degradate
- Isoxaflutole DKN degradate
- Molybdenum
- Perfluorooctane Sulfonate (PFOS)
- Perfluorooctanoic Acid (PFOA)
- Strontium
- Sulfentrazone
- Tetrachloroethylene (PCE)
- Thiamethoxam
- Thien carbazon-methyl
- Trichloroethylene (TCE)
- 1,2,3-Trichloropropane (1,2,3-TCP)

Status Update

- DHS scientists are currently reviewing available technical information to identify appropriate recommendations.
- Our goal is to complete this task by mid-2019.
- At that point, our recommendations will be sent to DNR for rule-making.

In Summary

- Water quality matters for the health of the people of Wisconsin.
- State and local agencies continue to work collaboratively to address both legacy and emerging water quality issues.
- DHS is committed to applying the best scientific evidence to inform actions that are protective of health.

Thank you!

Jon Meiman, MD

Chief Medical Officer and State
Occupational and Environmental
Disease Epidemiologist

jonathan.meiman@wi.gov

608-266-1253

Roy Irving, PhD

Hazard Assessment Section Chief

roy.irving@wi.gov

608-266-2663

