

# EMERGING CONTAMINANTS





## EMERGING CONTAMINANTS OF CONCERN

- Two Main Factors Leading to Additional Contaminant Monitoring
  - Science and Technology allows us to monitor and detect contaminants to lower levels
  - Social Media drives a demand to know “what is in the water we’re drinking?”



Wilmington NC

= Flint MI



GEN X

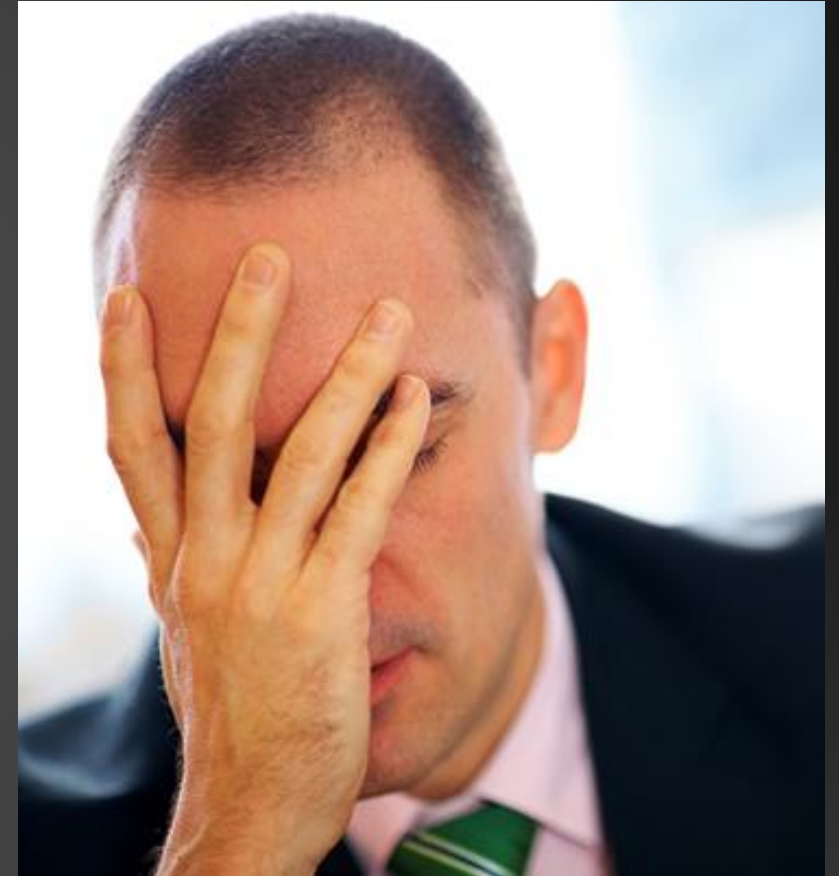


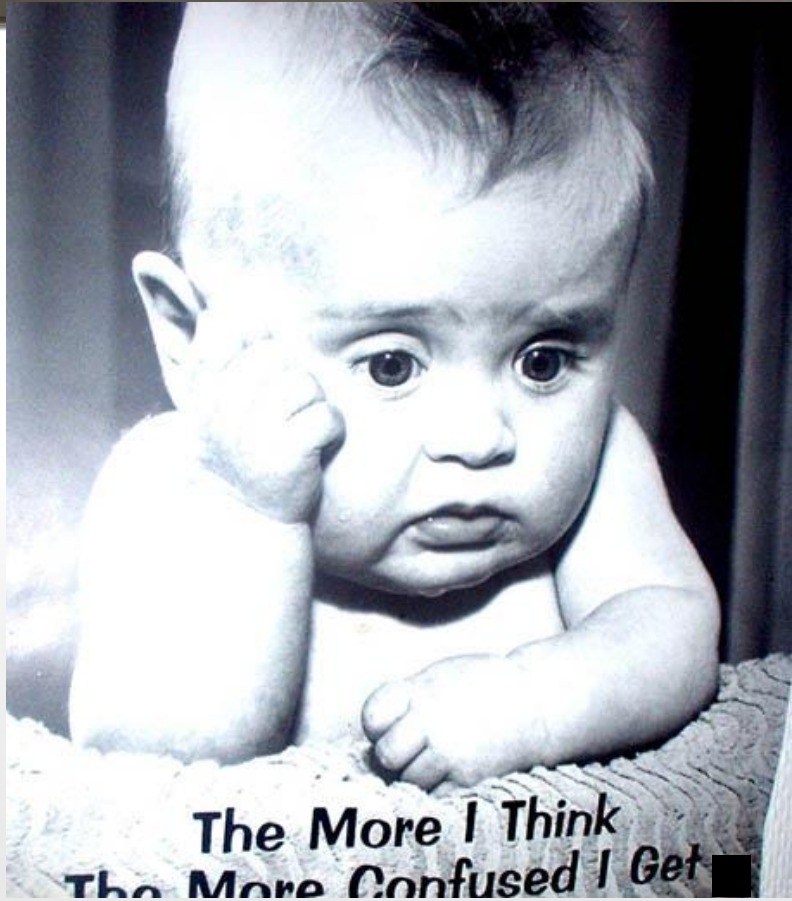
# USEPA AND UCMR

- Unregulated Contaminant Monitoring Rule Requirements
  - Monitoring < 30 contaminants w/o current health-based standards every 5 years
  - Analytical results are stored in the National Contaminant Occurrence Database for evaluation of need for regulatory actions

# UCMR

- UCMR Monitoring Rounds
  - UCMR 1 (2001-2005)
  - UCMR 2 (2007-2011)
  - UCMR 3 (2012-2016)
  - UCMR 4 (2017-2021)
  - UCMR 5 (2023-2026)





**TRYING TO  
MAKE SENSE  
OF ALL OF THIS!**

# EMERGING CONTAMINANTS

Subjects for Today:

Manganese

Harmful Algal Blooms

PFAS



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# MANGANESE

- Section 611.300 Old MCLs for Inorganic Chemical Contaminants



Iron 1.0 mg/L

Manganese 0.15 mg/L

Zinc 5 mg/L



# MANGANESE COMPLIANCE

- If a manganese sample result exceeds the MCL, the community water supply must notify the Agency within seven days and initiate three additional analyses at the same sampling point within one month
- If the average of the four samples exceeds the MCL, the Agency must be notified and public notification provided

## DOES THIS APPLY TO MY SYSTEM?

- CWSs that serve a population of 1000 or fewer, or 300 service connections or fewer, are exempt from the iron and manganese MCLs
- The Agency may allow iron and manganese in excess of the MCLs if sequestration is proven effective.
- If sequestration is not effective, treatment must be provided.



WAIT...WHAT WAS THAT?



## MANGANESE – WHY NOW?

- USEPA recommends that the general population should not ingest water with manganese concentrations greater than 1 mg/L for more than 10 days per year.
- Infants up to 6 months should not be given water with manganese concentrations greater than 0.3 mg/L
- Health Advisory language is provided by IEPA





# HARMFUL ALGAL BLOOMS (HABS)

IEPA



# HABs

- Causes:
  - Excess Nitrogen and Phosphorus From:
    - Agriculture
    - Stormwater
    - Wastewater
    - Residential Fertilizers
    - Warm / Stagnant Water

# HABs

- Effects of contact or incidental ingestion:
  - Human Health Impacts
    - Rashes
    - Gastrointestinal Distress
    - Respiratory Problems
    - Neurological Effects



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## **NOTICE**

An algae bloom has made this area potentially unsafe for water contact. Avoid direct contact with visible surface scum.

# HABS

- Potential Toxins Involved:  
Cyanotoxins
  - Microcystin
  - Cylindrospermopsin



Cyanotoxin	Drinking Water Health Advisory (10-day)	
	Bottle-fed infants and pre-school children	School-age children and adults
<b>Cylindrospermopsin</b>	0.7 µg/L	3.0 µg/L
<b>Microcystins</b>	0.3 µg/L	1.6 µg/L



# HABS



- Recommended Human Health Recreational Ambient Water Quality Criteria (Swimming Advisories for Microcystins and Cylindrospermopsin)
  - From USEPA
  - Avoid primary contact with water above these levels

Microcystins	Cylindrospermopsin
8 ug/L	15 ug/L

# HABs

- Desk Top Monitoring for Microcystins (Presence/Absence)



# HABS



- IEPA's HAB Program:
  - Routine Monitoring of Targeted Subset of Inland Lakes
  - Routine Monitoring of Subset of Lake Michigan PWS' Intakes
  - Event Response Monitoring
    - Visual
    - Reported- Bloom Report Form  
<https://www2.illinois.gov/epa/Documents/epa.state.il.us/water/algal-bloom/forms/bloom-report-form.pdf>

# HABs

- **SAMPLING**

- **RAW** – prior to any treatment

- **FINISHED** – after all



# HABS



- Problems Associated w/ HABs
  - Distribution Taste & Odor Issues
  - Operational/Treatment impacts associated with pH changes (disinfectant residuals, coagulation/sedimentation, shortened filter runs, etc.)

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**HABs – IS IT FIXABLE?**

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# HABs



- Treating the Source Water (Lake / Reservoir)
  - Copper Sulfate Products Can Be Used to Prevent Bloom (Not effective: pH>8.2)
  - Increase Carbon Feed Rate to Minimize Taste & Odor Impacts
  - Destratifiers Have Been Beneficial in Minimizing Conditions that Promote Bloom Growth
  - Install Treatment for Reducing Compounds that create T&O problems
    - UV w/ Advanced Oxidation Process (Hydrogen Peroxide Feed)



PFAS





## PFAS : WHAT IS IT?

- Per- and Polyfluoroalkyl Substances are Man-Made Chemicals manufactured for their oil and water-resistant properties.
- Used In A Wide Range of Consumer Products (cookware, carpets, clothing), Industrial Processes, Fire-Fighting Foams, etc.
- Known as “Forever Chemicals” because the Carbon and Fluorine Bond does not breakdown easily.
- PFAS chemicals are very mobile in soil and groundwater!



PFAS  
RESEARCH

- My Recommendations:
- “Troubled Waters” – book that can be purchased anywhere
- “The Devil We Know” – documentary found on YouTube

# TREATING PFAS IN DRINKING WATER

- Membrane Filtration
  - Reverse Osmosis – high removal efficiency for PFAS especially short-chain parameters.
    - Consideration should be given to waste stream.
  - Nanofiltration – also considered effective in short-train parameter removal.
    - Pre-treatment and post-treatment may be necessary to prevent membrane fouling and stabilization.

## TREATING PFAS IN DRINKING WATER (CONT'D)

- Anion Exchange – more effective in the removal of long-chain PFAS
  - Removal efficacy is dependent upon the type of resin used
  - Again - Consideration should be given to the waste stream

# TREATING PFAS IN DRINKING WATER (CONT'D)

- Granular Activated Carbon
  - Generally more effective for long-chain PFAS
    - Individual Treatment Units
    - Package Treatment Skids
    - Mobile Treatment Trailers



# TREATING PFAS IN DRINKING WATER (CONT'D)

- Granular Activated Carbon (cont'd)
  - Efficacy dependent on raw water quality and the competition for absorption by GAC.
  - Disposal of “spent” GAC must be considered
    - Thermal regeneration of GAC is possible
    - Incineration has been shown to destroy PFAS, but may cause release to atmosphere

# TREATING PFAS IN DRINKING WATER (CONT'D)

- Powdered Activated Carbon
  - Can be fed a dry powder or slurry during coagulation process
  - PAC is not as effective as GAC, membrane filtration, or anion exchange
  - Again – consideration must be given to waste stream

# PFAS – AGENCY SAMPLING PROGRAM

- The Illinois EPA conducted PFAS sampling at approximately 1450 entry points.
- Sampling for 18 PFAS parameters
- Systems will be notified by mail regarding scheduled sampling times (don't ignore the letter)
- Follow-up correspondence will be provided for notification of sample results.







**PFAS – I HAVE  
THE RESULTS,  
NOW WHAT?**

## PFAS – FIND THE SOURCE

- Find the source of contamination
  - Sampling of source water
    - Wells
    - Intake(s)

PFAS  
SAMPLING –  
I FOUND THE  
PROBLEM



PROBLEM SOLVING

Have you got a problem?

This Photo

# PFAS – OTHER CONSIDERATIONS

- Other Considerations:
  - Proximity to potential sources (examples)
    - Industrial Sites
    - Landfills
    - Military Bases
    - Firefighter Training Locations
    - Metal Plating Facilities



## PFAS – I FOUND THE PROBLEM



- Can the contaminated source (well/intake) be eliminated and still meet daily demand?
- Can treatment changes be made to remove PFAS contaminants?
  - Is there treatment in place that can be modified? (changing membranes/resin/carbon, etc.)

# PFAS – I HAVE NO TREATMENT OPTIONS – WHAT CAN I DO?

- Consider the following:
  - Do I have access to an alternative source (interconnection with another public water supply)?
  - Point-of-Use / Point-of-Entry Devices
  - Bottled Water



# ILLINOIS EPA PFAS WEBPAGE

## [HTTPS://WWW2.ILLINOIS.GOV/EPA/TOPICS/WATER-QUALITY/PFAS/PAGES/DEFAULT.ASPX](https://www2.illinois.gov/epa/topics/water-quality/pfas/pages/default.aspx)



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Protection Agency



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IEPA ▸ Topics ▸ Water Quality ▸ Per- and Polyfluoroalkyl Substances

## Per- and Polyfluoroalkyl Substances (PFAS)

Per- and Polyfluoroalkyl Substances (PFAS) are a group of approximately 5,000 human-made chemicals that are manufactured for their oil and water-resistant properties. Since the 1940s, PFAS have been used in a wide range of consumer products, industrial processes, and in some fire-fighting foams (called aqueous film-forming foam or AFFF). This has resulted in PFAS being released into the air, water and soil.

### Navigation

[Background and Sources of PFAS](#)  
[Routes of Exposure](#)  
[Ways to Reduce Exposure](#)  
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[Federal Regulatory Actions](#)

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### PER- AND POLYFLUOROALKYL SUBSTANCES

[PFAS Statewide Investigation Network: Community Water Supply Sampling](#)

[PFAS Investigation Network Interactive Dashboard and Map](#)

[Groundwater Standards Development](#)

[Process to Establish Maximum Contaminant Levels for PFAS in Illinois](#)

### Background and Sources of PFAS

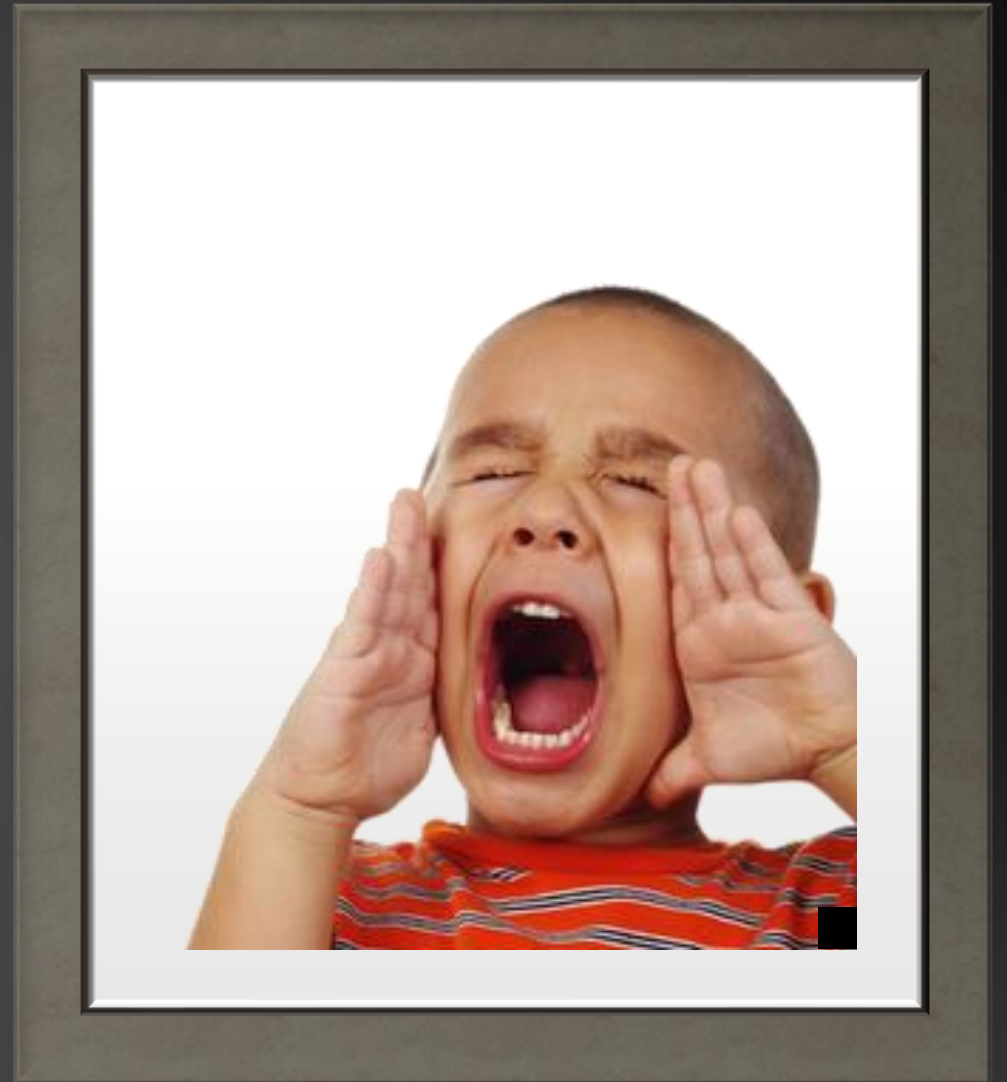
PFAS are made up of chains of carbon and fluorine linked together. The carbon-fluorine bond is one of the shortest and strongest bonds in nature and does not easily break down under natural conditions. For this reason, PFAS are often referred to as "forever chemicals."



Perfluorooctanoic acid (PFOA)

# MORE PFAS

- USEPA Rulemaking





## USEPA PROPOSED RULE

- Enforceable MCL for PFOS and PFOA
- Enforceable limit on a combination of PFNA, PFHxS, PFBS, and GenX Chemicals
- Monitoring requirements
- Public Notification



# USEPA PROPOSED RULE

Compound	Proposed MCLG	Proposed MCL (enforceable levels)
PFOA*	zero	4.0 ng/L (ppt)
PFOS*	zero	4.0 ng/L (ppt)
PFNA*	1.0 (unitless) Hazard Index	1.0 (unitless) Hazard Index
PFHxS*		
PFBS*		
HFPO-DA (GenX chemicals)*		

\* Indicates that compound is included in UCMR5 monitoring

## PFAS AND REGULATED PQLs

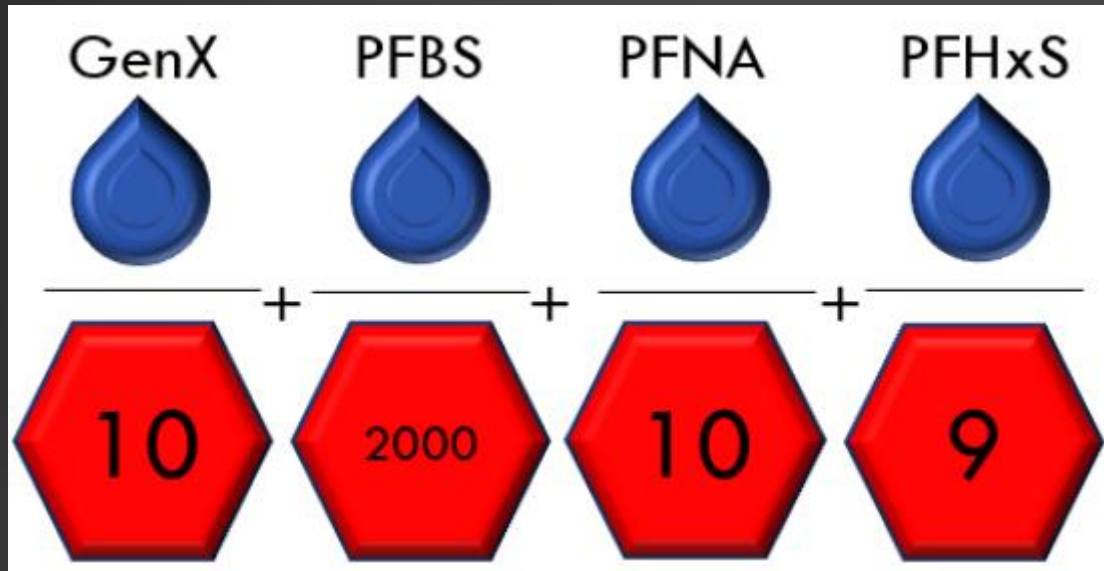
Compound	Practical Quantitation Level (ppt)
PFOS	4.0
PFOA	4.0
PFHxS	3.0
GenX Chemicals	5.0
PFNA	4.0
PFBS	3.0

## WHAT THE HECK IS A HAZARD INDEX?

The Hazard Index (HI) is a sum of fractions representing the comparison of measured concentrations with the corresponding level determined not to cause health effects (HBWC or Health Based Water Concentration)



# HEALTH INDEX EXAMPLE



= Health Index Value

All units are ng/L

## HEALTH INDEX (cont.)

If the Health Index value  $> 1.0 =$   
MCL violation



## FINAL THOUGHTS

- The Rulemaking is in the public comment period, it is not FINAL
- Systems are not required to do anything with regard to the federal rulemaking until the rule is final and the implementation period is established.

## MORE FINAL THOUGHTS

- The Bipartisan Infrastructure Law provide \$9 billion to invest in drinking water systems impacted by PFAS and other emerging contaminants
  - \$4 billion through SRF funds
  - \$5 billion through EPA's Emerging Contaminant in Small or Disadvantaged Communities Grant Program
  - IEPA will determine how funding will be dispersed through a State rulemaking



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QUESTIONS?

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