



# Emerging Contaminants

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# emerging contaminants



- what are they?
- where do they come from?
- what is happening at the national and state level?
- how does it affect my business?
- how does one deal with these contaminants?
- pilot programs for treatment

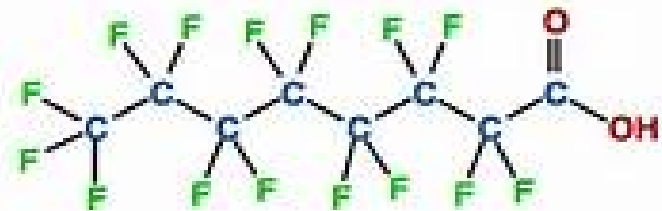
# what are emerging contaminants?

- Emerging contaminant is a loose term that can apply to a lot of compounds
- Agencies that hold jurisdiction include
  - Federal Level (US EPA)
  - States (e.g. MDEQ)
  - Local – maybe?
- ECs covered today: PFAS and 1,4-Dioxane

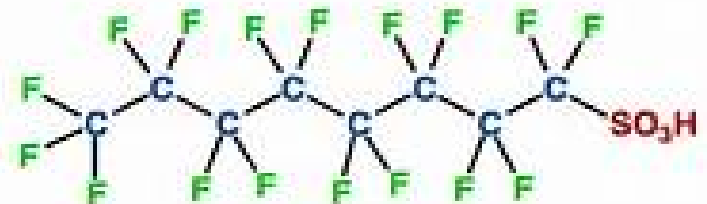
# PFAS – what are they?

- **PFAS** (formerly “PFCs”): per- and polyfluoroalkyl substances, a class of synthetic compounds
  - **PFOA**: perfluorooctanoic acid
  - **PFOS**: perfluorooctane sulfonate
  - and many more
  - **GenX**: replacement products

*“There are more than 3000 PFAS chemicals in the global market”*



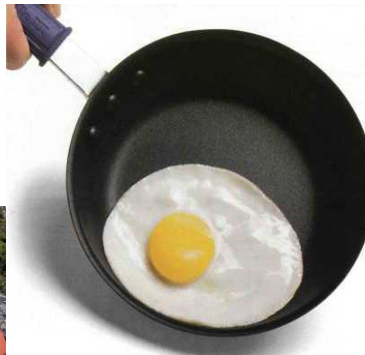
PFOA - perfluorooctanoic acid



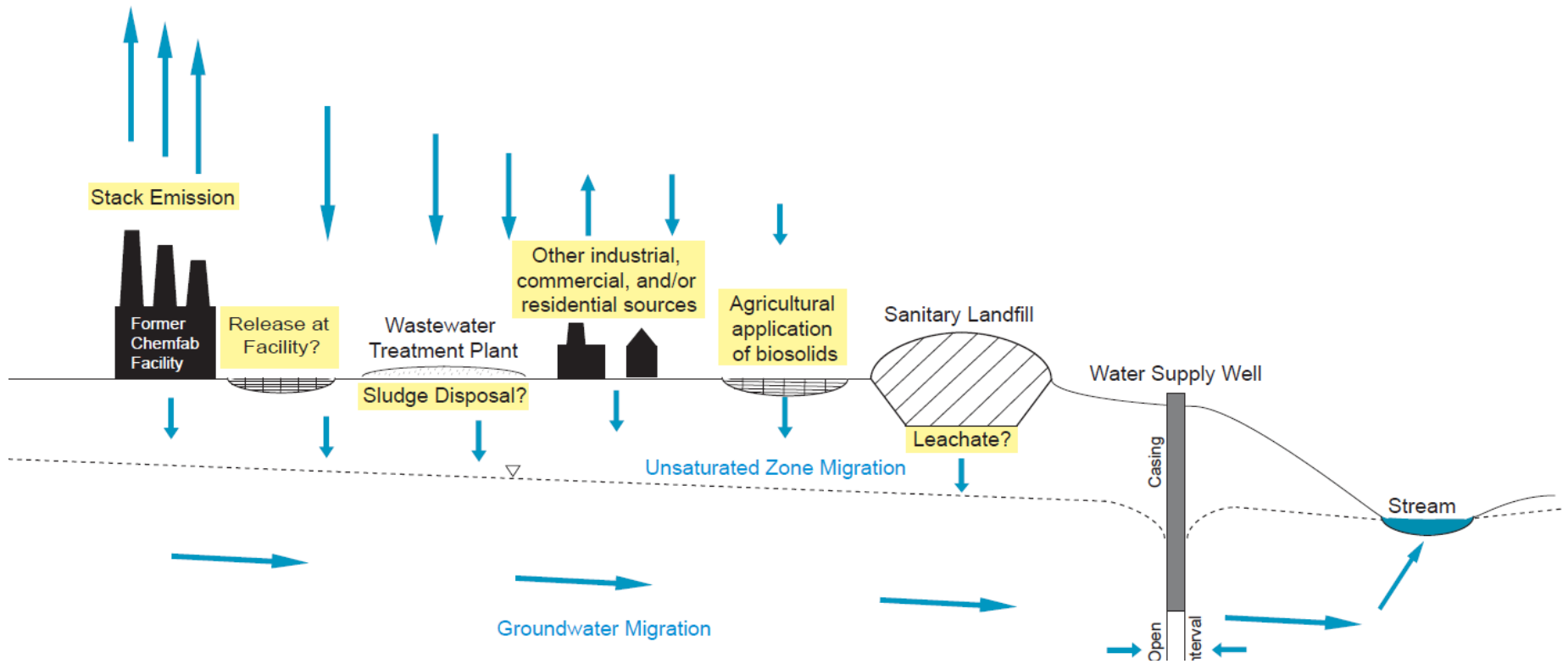
PFOS - perfluorooctanesulfonic acid

# PFAS – where do they come from?




- found in: non-stick cookware, electronics, food packaging, stain/water repellent fabric, **fire fighting foams**, paints/coating, and many more....



# PFAS – where do they come from?



**LEGEND**

-  Water Table
-  PFOA Migration
-  Potential PFOA Release Method

## Soil & Groundwater Contamination Pathways



# PFAS laws and regulations

- 2016 EPA released Health Advisories (HAs) for PFOA/PFOS
  - 14 States (and counting) have released/revised criteria recently

	EPA drinking water (PPT)	MDH drinking water (PPT)	NJDEP drinking water (PPT)	MDEQ drinking water (ppt)	Health Canada (ppt) - * to be revised in 2018
PFOS	70	27	11	70	200*
PFOA	70	35	14	70	600*
PFOA +PFOS	70			70	

*1 ppt = 1 droplet of water in 660,000 gallons*

# PFAS – how do we look for them?

- EPA developed a laboratory method for measuring PFOS, PFOA, and 12 other PFAS in drinking water (EPA Method 537)
  - Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)

*“Labs only analyze for 6 to 39 compounds”*

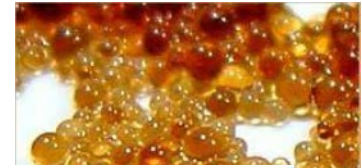
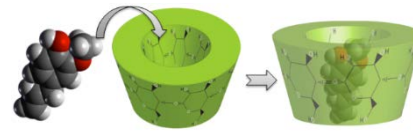




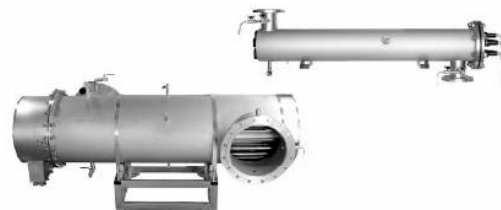
# PFAS – how do we look for them?

- What are the big issues
  - bad data – method 537 is modified by every laboratory
  - cross contamination – **parts per trillion is a small number**
  - PFAS is a group of compounds, analytical lists are and will continue to expand
  - analytical chemistry is ahead of toxicology
  - PFOA and PFOS were replaced with other chemicals (GenX)

# Treatment Technologies – Further Research and Optimization Needed



- Polymer adsorption
- Ion-exchange
- Membrane filtration (RO)
- Granulated activated carbon
- Advanced oxidation processes



# PFAS - how does it affect my business?

## ➤ in Michigan

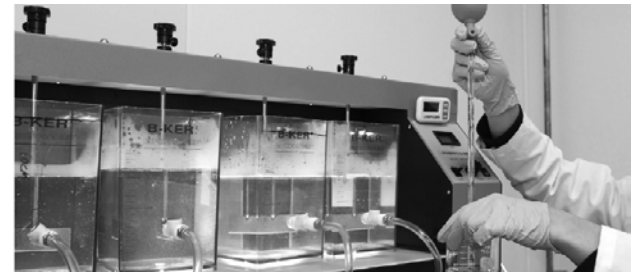
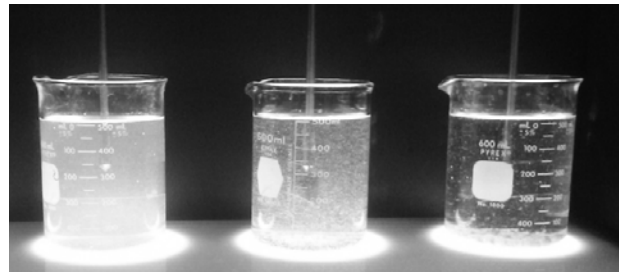
- POTWS are actively sampling for PFAS compounds
- POTWS are sending out questionnaires to industrial facilities
- Public water suppliers are required to sample and report PFAS

## ➤ communities are rallying up.... 9,400 people are members of an on-line "North Carolina Stop GenX in our Water" group

## ➤ utilities (rate payers) are reluctant to bear the cost to address source water contamination by Others.

## Barr's PFAS experience

- confidential evaluations: Michigan, other states
- bench tests to confirm removal efficiencies
- analytical data evaluation and validation
- negotiate with state and federal regulators
- litigation support for toxic tort cases
- environmental forensics





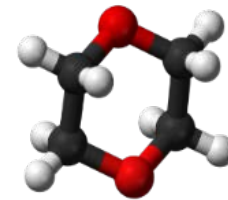
- **May 22-23**, EPA hosted a National Leadership Summit in Washington, D.C. to take action on PFAS in the environment.
  - share information on ongoing efforts to **characterize risks from PFAS** and **develop monitoring and treatment/cleanup techniques**
  - identify specific near-term actions, beyond those already underway, that are needed to address challenges currently facing states and local communities
  - develop risk communication strategies that will help communities to address public concerns with PFAS
  - **develop a PFAS Management Plan for release fall 2018.**

<https://www.epa.gov/pfas/pfas-national-leadership-summit-and-engagement>

# other emerging contaminants

- 1, 4-Dioxane

- Solvent enhancer, usually present in Tri-chloroethylene (TCE) plumes
- Very mobile in water
- Stable and hard to degrade



	<b>DX Concentration</b>
Federal SDWA	No limit
California Action Level	3.0 µg/L
MDH Health Risk Limit (since 2013)	1.0 µg/L
New Brighton WTP1 wells	1.0-6.8 µg/L

# other emerging contaminants

- Barr is tracking several other ECs examples include
  - methyl tert butyl ether (MTBE)
  - disinfection byproducts
  - pesticides
  - others

# emerging contaminants

