Addressing Emerging Contaminants in Groundwater Surveillance Monitoring

RemTech, October 15, 2021, 8:30-9:00 am

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Agenda

1. PFAS Source Considerations- What are they? Why are they a problem?

2. Occurrence Monitoring by Geography
   - ✓Europe
   - ✓US
   - ✓Canada

3. Example Surveillance Monitoring Program

4. Considerations moving forward

Objective:

Understand status of occurrence monitoring and what to consider

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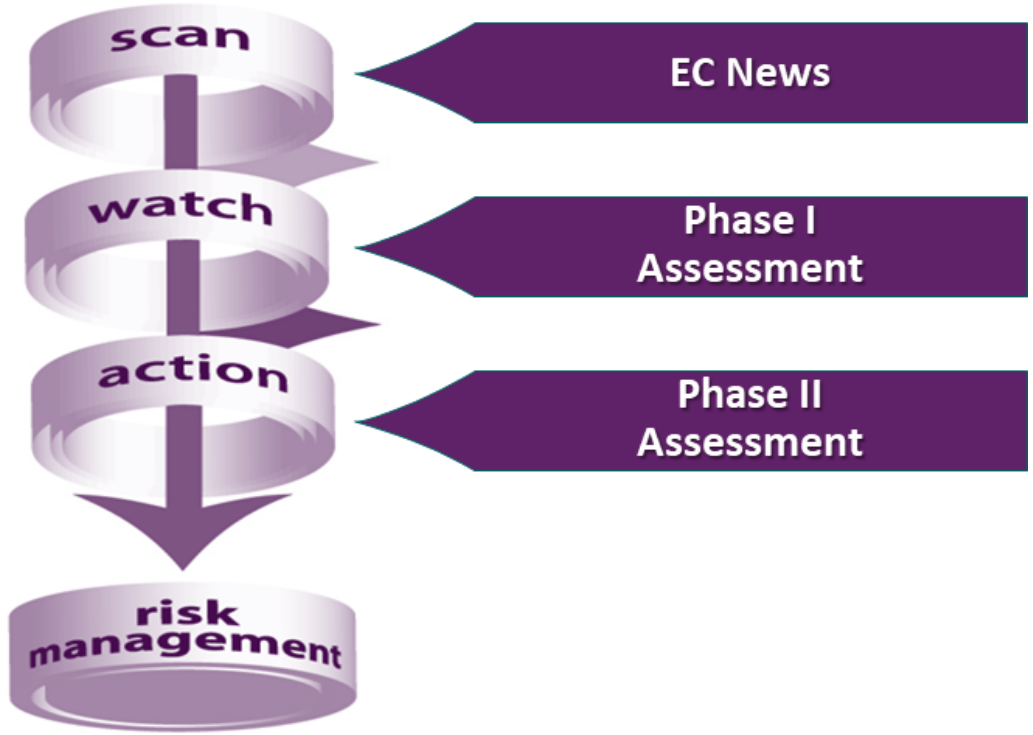
PFAS Source Considerations- What are they? Why are they a problem?

PFAS Source Considerations- Emerging Contaminant- What are they?

- US DoD and USEPA definitions generally state:
  - ✓ Presents potential unacceptable risk
  - ✓ Has no published standard
  - ✓ New science, detection, or exposure pathway available[1,2, 3]

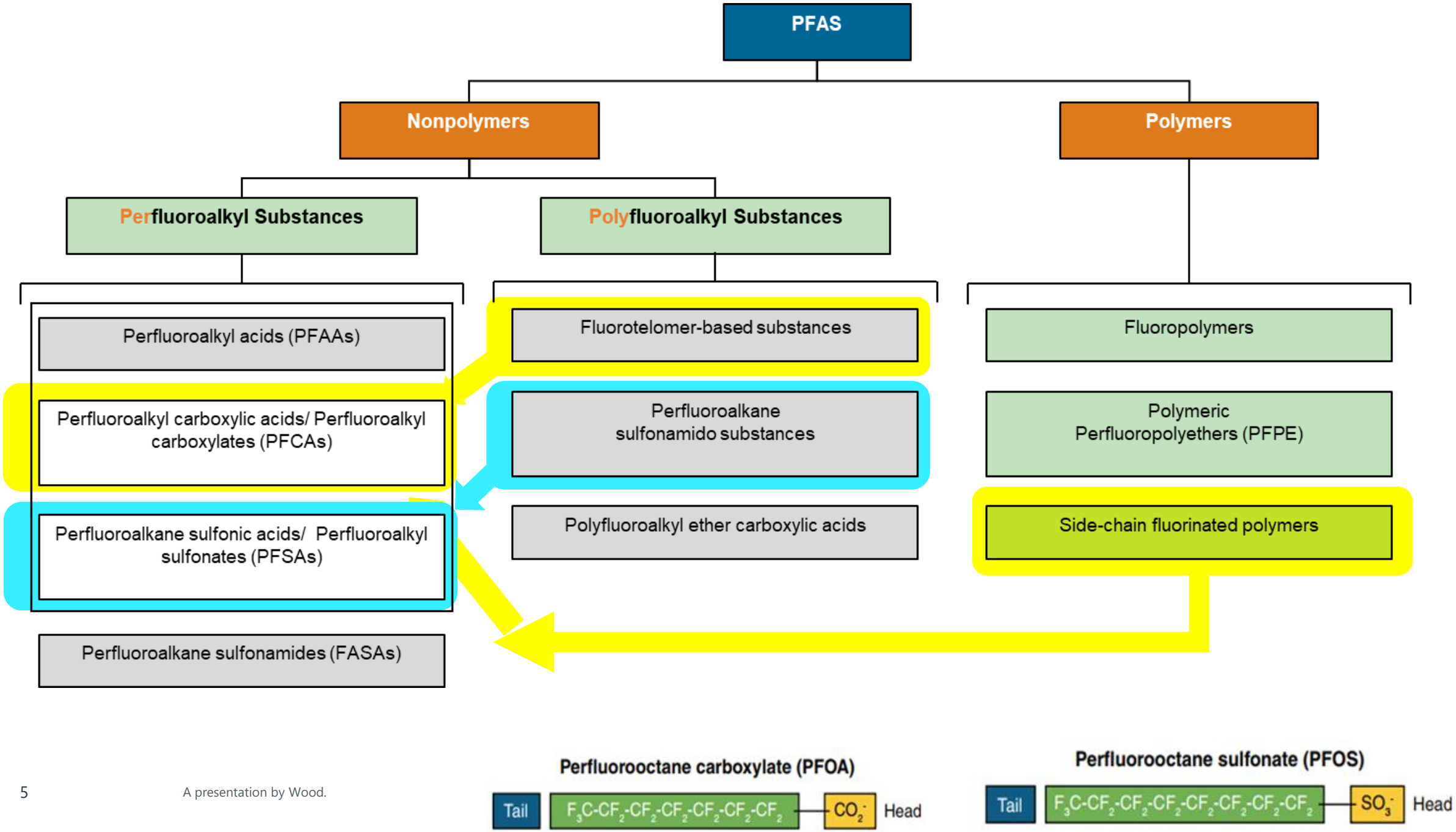


DoD Scan, Watch, Action Process

[1] DoD Instruction 4715.18, *Emerging Chemicals of Environmental Concern, September 4, 2019*. Office of the Under Secretary of Defense for Acquisition and Sustainment

[2] EPA Federal Facilities Restoration and Reuse Office: http://www.epa.gov/fedfac/documents/emerging_contaminants.htm#additional_ec

[3] http://toxics.usgs.gov/regional/emc/


PFAS
Nonpolymers
Polymers
Perfluoroalkyl Substances
Polyfluoroalkyl Substances
Perfluoroalkyl acids (PFAAs)
Perfluoroalkyl carboxylic acids/ Perfluoroalkyl carboxylates (PFCAs)
Perfluoroalkane sulfonic acids/ Perfluoroalkyl sulfonates (PFSAs)
Perfluoroalkane sulfonamides (FASAs)
Fluorotelomer-based substances
Perfluoroalkane sulfonamido substances
Polyfluoroalkyl ether carboxylic acids
Fluoropolymers
Polymeric Perfluoropolyethers (PFPE)
Side-chain fluorinated polymers
Perfluorooctane carboxylate (PFOA)
Tail
$F_3C-CF_2-CF_2-CF_2-CF_2-CF_2-CF_2$
CO_2^-
Head
Perfluorooctane sulfonate (PFOS)
Tail
$F_3C-CF_2-CF_2-CF_2-CF_2-CF_2-CF_2-CF_2$
SO_3^-
Head

Where are they?

Uses of PFAS from the Chemical Data Reporting under the TSCA from 2016. Gluge et al, 2020.

Sector and function	Amount [t]
Paint and coating manufacturing - Adhesive and sealant chemicals	0.001
Industrial gas manufacturing - Air conditioner/refrigeration	**138**
Computer and electronic product manufacturing - Solvent for cleaning and degreasing	1.03
Electrical equipment, appliance, and component manufacturing - Functional fluid	**2180**
Fabricated metal product manufacturing - Solvent for cleaning and degreasing	0.11
All other chemical product and preparation manufacturing - Fire-fighting foam agents	**190**
Machinery manufacturing - Functional fluid	**2180**
Miscellaneous manufacturing - Solvent for cleaning and degreasing	0.10
Oil and gas drilling - Surface active agent	0.022
Paint and coating manufacturing - Adhesives and sealant chemicals	0.31
Paint and coating manufacturing - Finishing agent	0.005
Paper manufacturing - Finishing agent	0.005
Pesticide, fertilizer, and other agricultural chemical manufacturing - Surface active agents	0.07
Miscellaneous manufacturing - Plating agent and surface treating	1.96
Printing ink manufacturing - Processing aids, not otherwise listed	0.001
All other basic inorganic chemical manufacturing - Refrigerant (heat transfer fluid)	**450**
Rubber product manufacturing - Rubber compounding	0.13
Soap, cleaning compound, and toilet preparation manufacturing - Surface active agents	0.12
Textile, apparel and leather manufacturing - Finishing agents	0.16

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Why are they a problem?

"The PFAS Domino Effect – follow the water"

- ✓ Is the source from off-site (e.g. process water intake or supply wells)?
- ✓ Are on-site activities exacerbating the problem (e.g. ISCO, etc.)
- ✓ Are there on-going low-level source contributions on-site or off-site? (e.g. thermal oxidation or air translocation)

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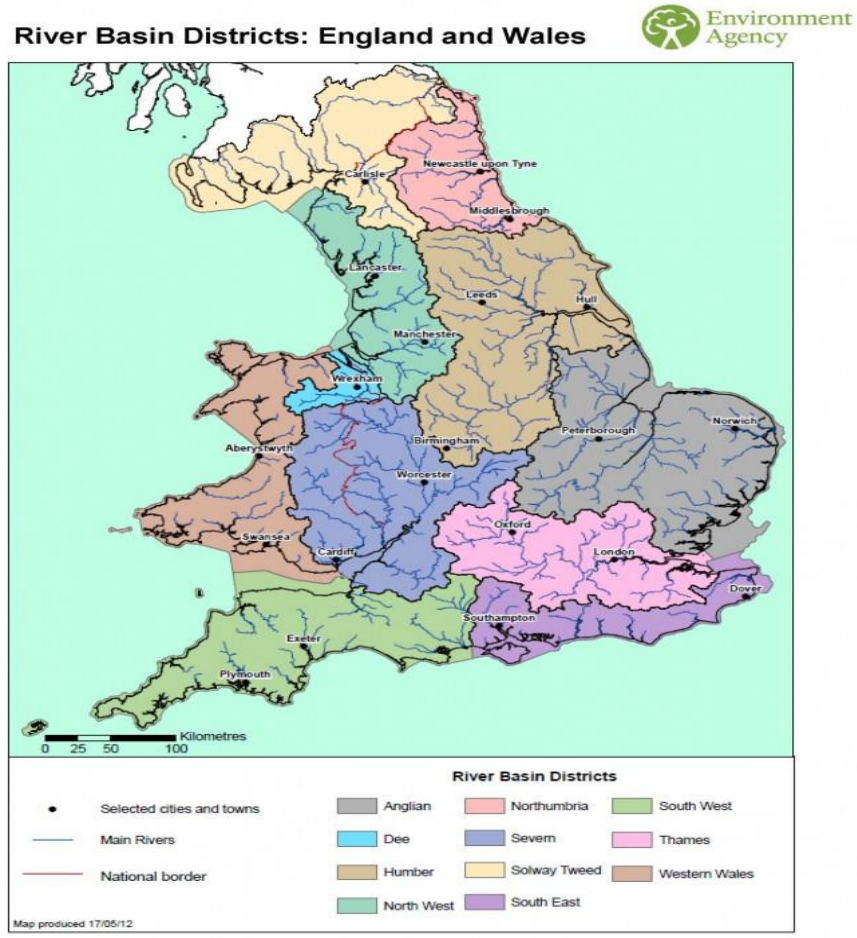
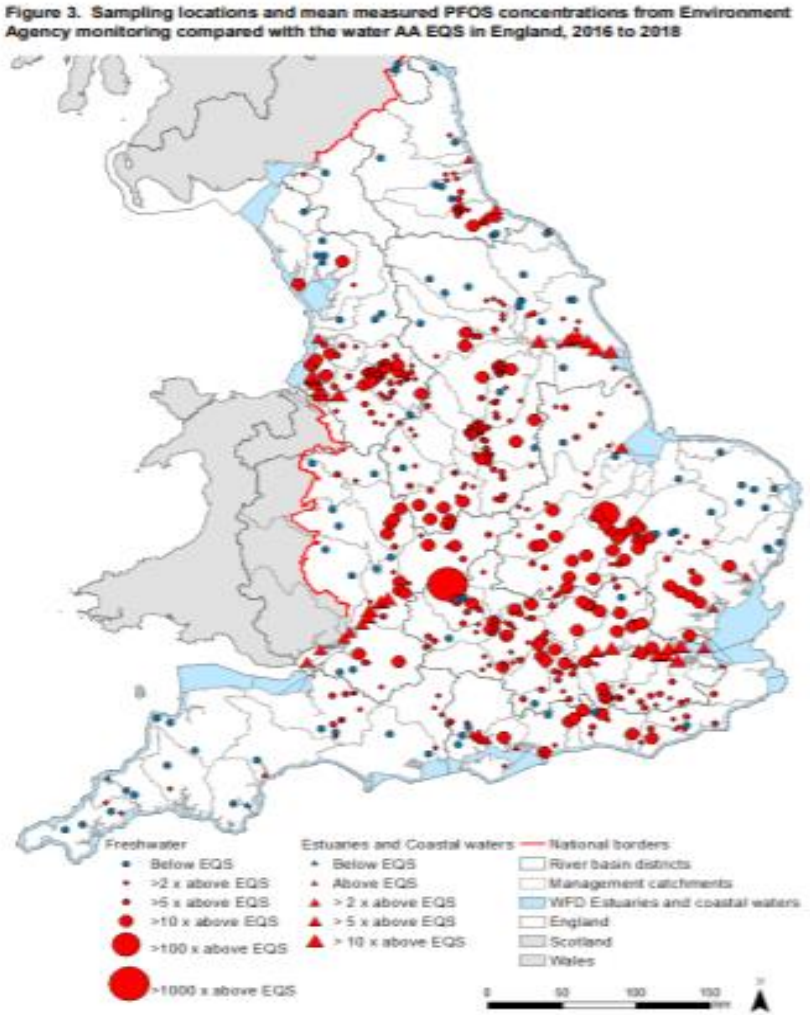
Occurrence Monitoring by Geography- Where do we see it ?

Occurrence Monitoring in Europe (e.g UK)

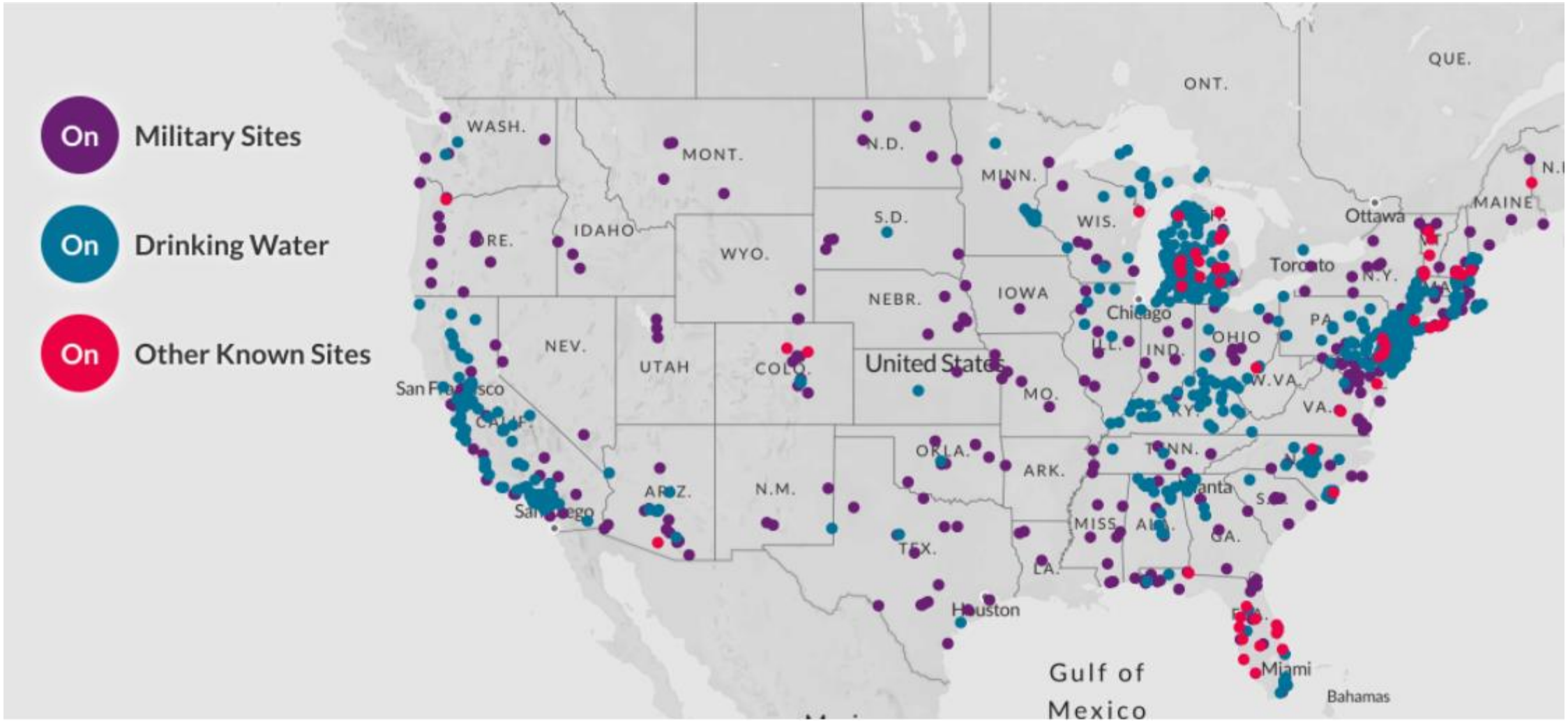
EFFORT



OUTCOME



Occurrence Monitoring in the US



https://pfasproject.com/2020/04/23/mapping-the-pfas-contamination-crisis/

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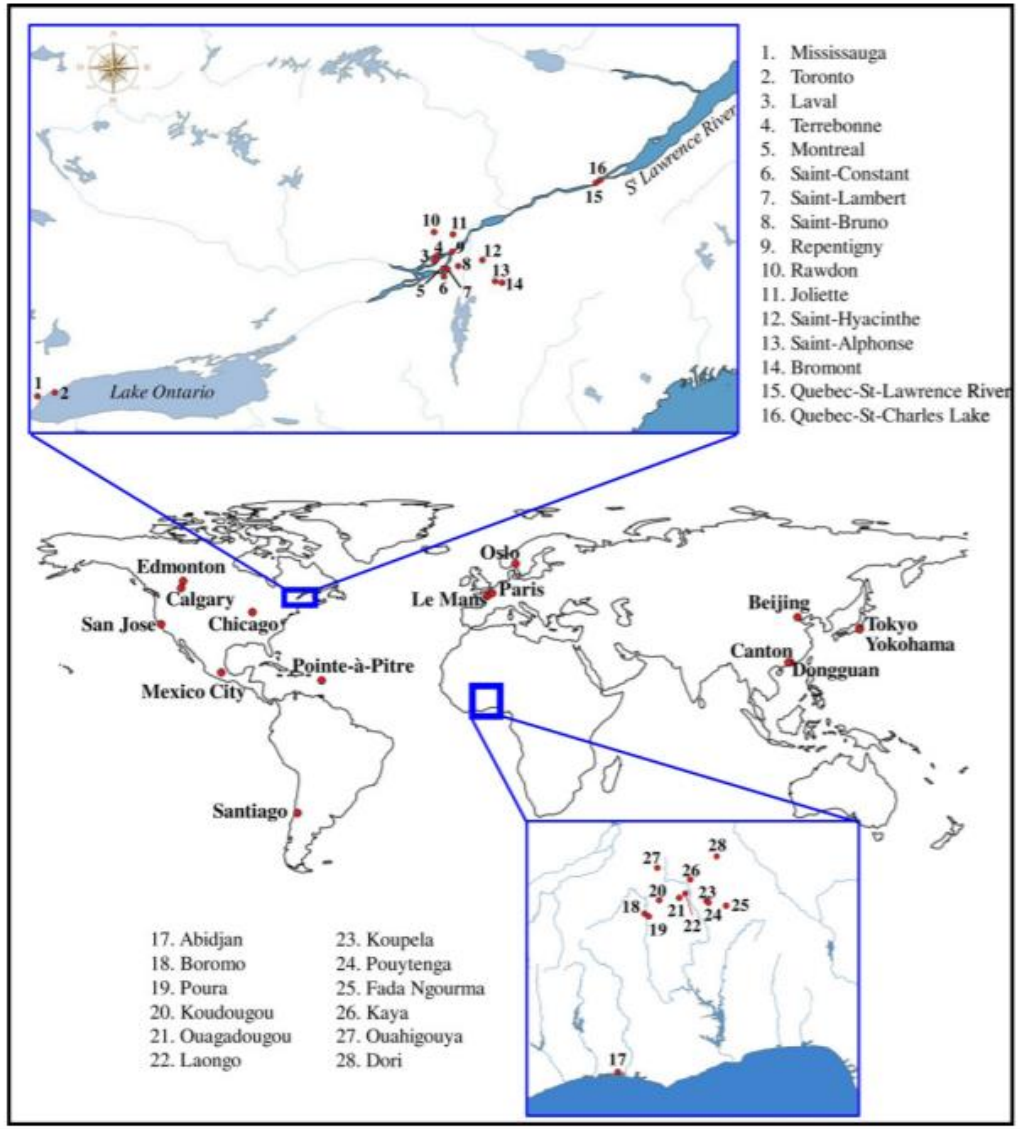
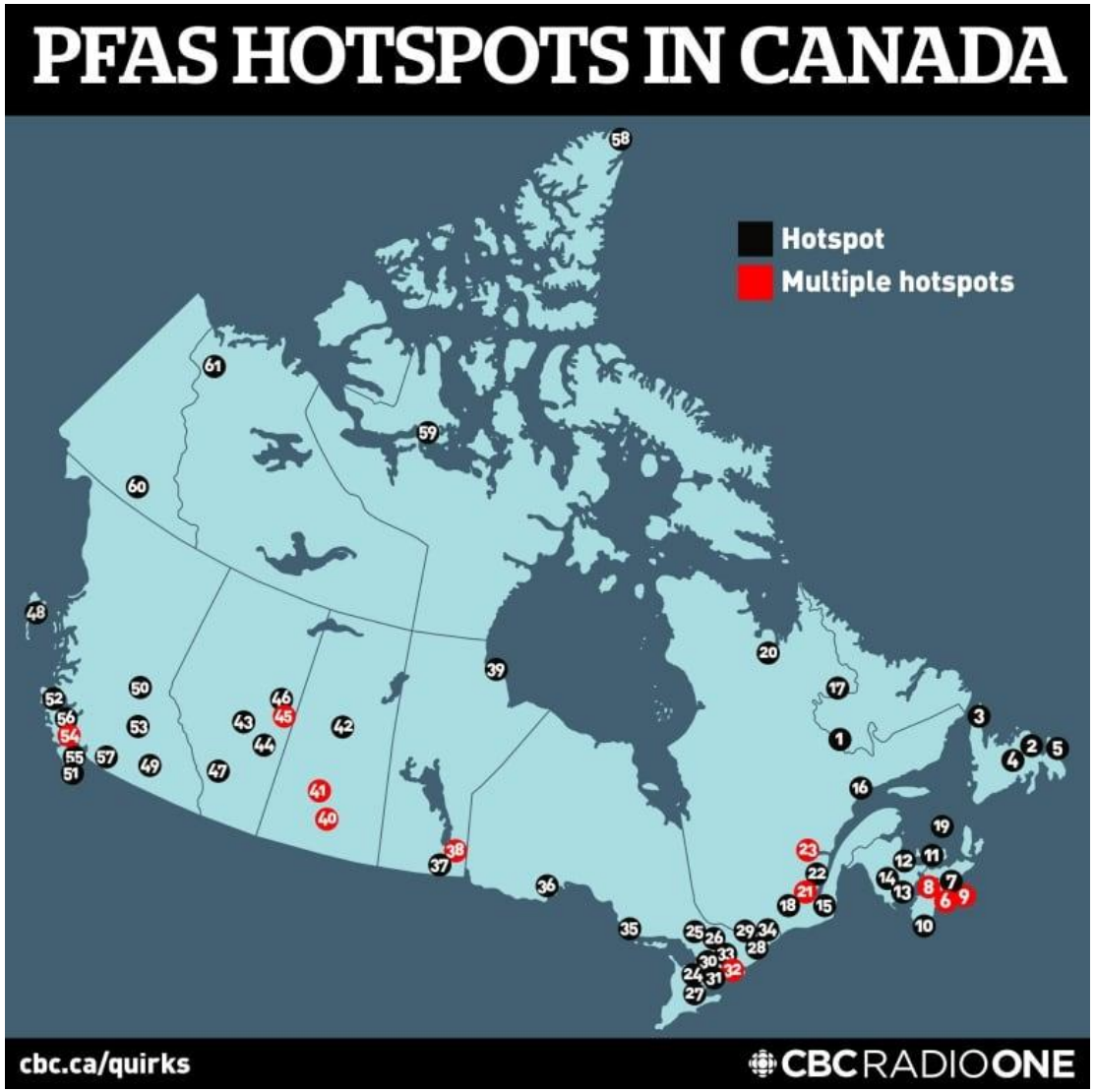
Occurrence Monitoring in the US

OCCURRENCE MONITORING	*OUTCOME*
• US-wide PWS 2013-2015	• PFAS detected in 1.6% of samples and 4% of PWS
• PA- PWS 2019-2021	• PFAS detected in approx. 25% of targeted PWS
• IL- PWS 2021-present (98% complete)	• PFAS detected in 5% of PWS and 4% above guidance level
• CA-PWS 2019-2020	• PFAS detected in approx. 75% of targeted PWS
• MI-PWS 2018	• PFAS detected in 10% of PWS
• US-wide PWS 2023-2025	• TBD

Occurrence Monitoring in Canada





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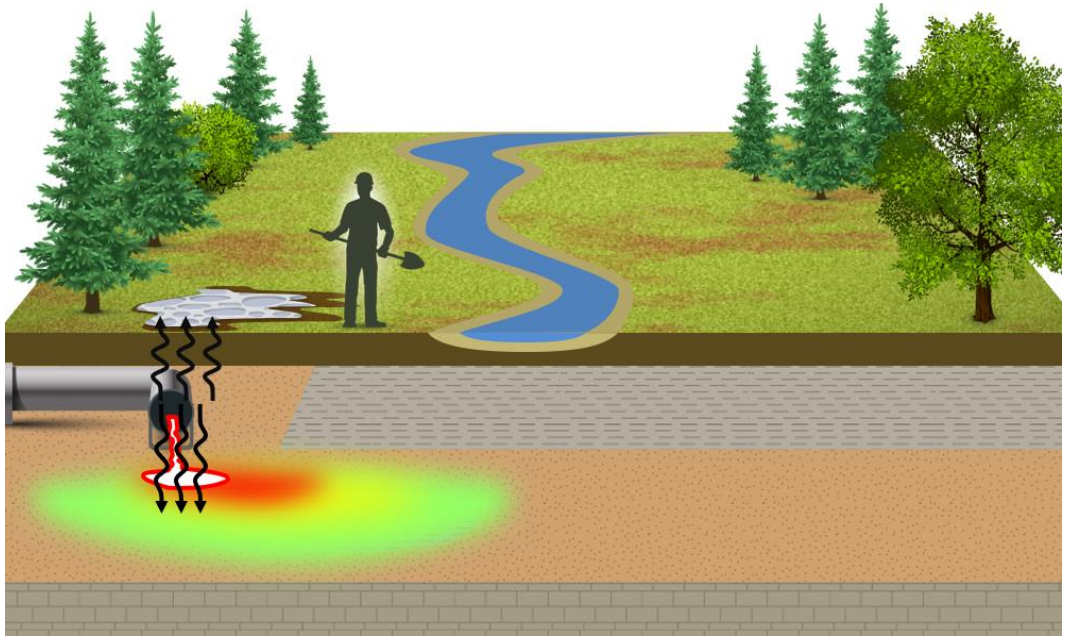
Alberta Surveillance Monitoring Program

Reactive vs Proactive Monitoring

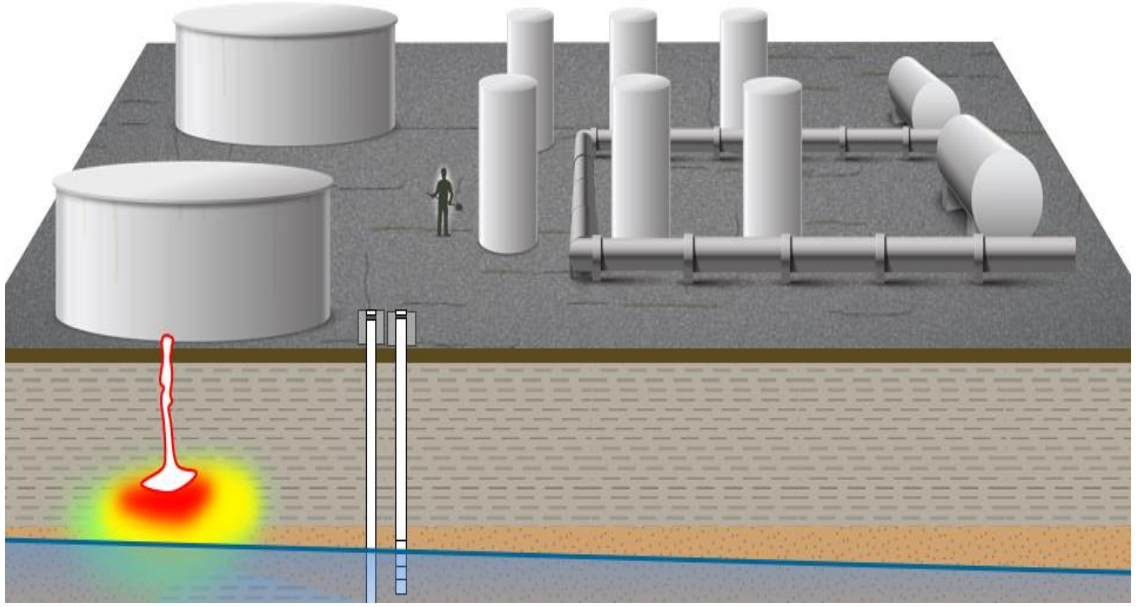
Prohibited release where no approval or regulation

109(1) No person shall knowingly release or permit the release into the environment of a substance in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect.



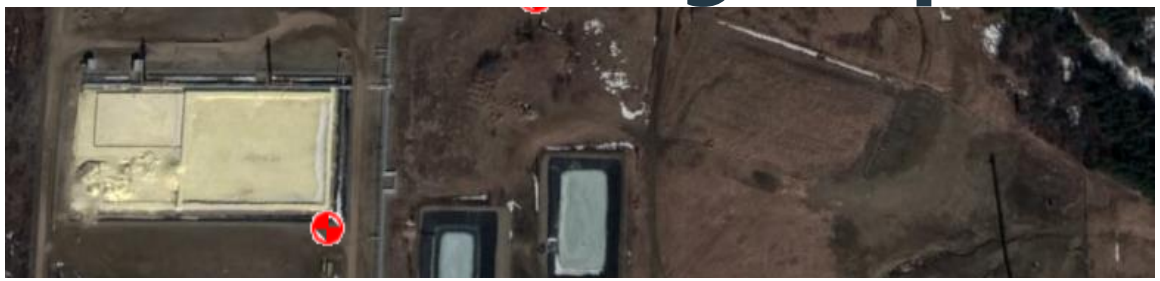
Duty to take remedial measures

112(1) Where a substance that may cause, is causing or has caused an adverse effect is released into the environment, the person responsible for the substance shall, as soon as that person becomes aware of or ought to have become aware of the release,



Alberta - Surveillance Monitoring Requirements

Soil Surveillance Monitoring Requirements



2.1.4. Facility-Specific Substances

2.1.4.1. The approval holder shall analyze all facility-specific substances associated with the operation.

Facility-specific substances are those that may be present as a result of operation of the plant. The approval holder must review past and current operations to develop a list of facility-specific substances. The *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV, 2009a), as amended, can be referred to for a listing of contaminants that could be considered as facility-specific

GW Surveillance Monitoring Requirements

4.5.1 The approval holder shall submit an updated Groundwater Monitoring Program proposal to the Director on or before March 31, 2016, unless otherwise authorized in writing by the Director.

4.5.2 The Groundwater Monitoring Program proposal shall include, at a minimum, all of the following:

(q) a list of parameters to be monitored and the monitoring frequency for each groundwater monitor well or group of groundwater monitor wells at the plant;

4.5.3 If the updated Groundwater Monitoring Program proposal is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director, by the date specified in writing by the Director.

4.5.4 The approval holder shall implement the updated Groundwater Monitoring Program as authorized in writing by the Director. Groundwater monitoring shall be carried out as per the existing monitoring program until that time.

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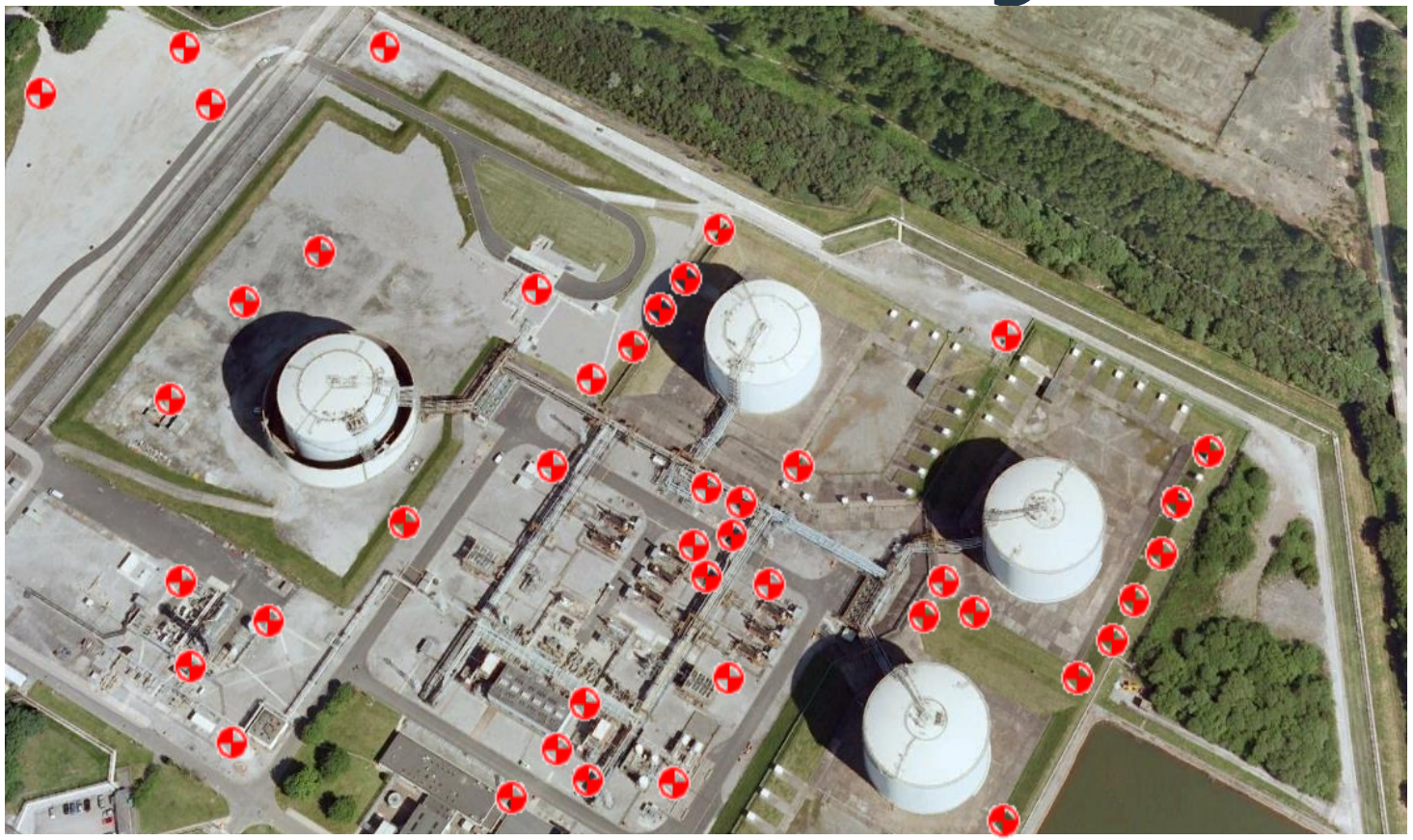
Issues with Surveillance Monitoring



4.5.13 The approval holder shall only implement reductions to the Groundwater Monitoring Program as authorized in writing by the Director.

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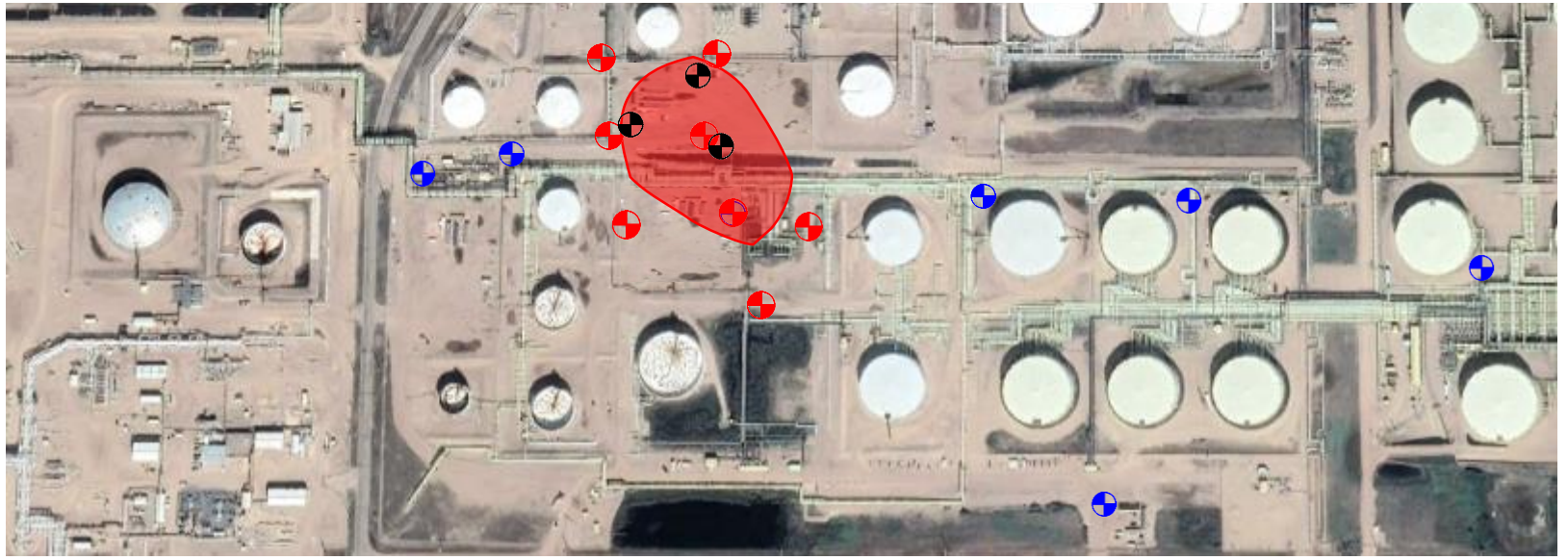
A Different Approach…

The approval holder shall implement a groundwater monitoring program which shall include:

(a) a Groundwater Surveillance Monitoring Program to identify any impacts to the quality of groundwater associated with facility operations, and

(b) a Contamination Management Program to prevent adverse effects or further adverse effects to the quality of groundwater.



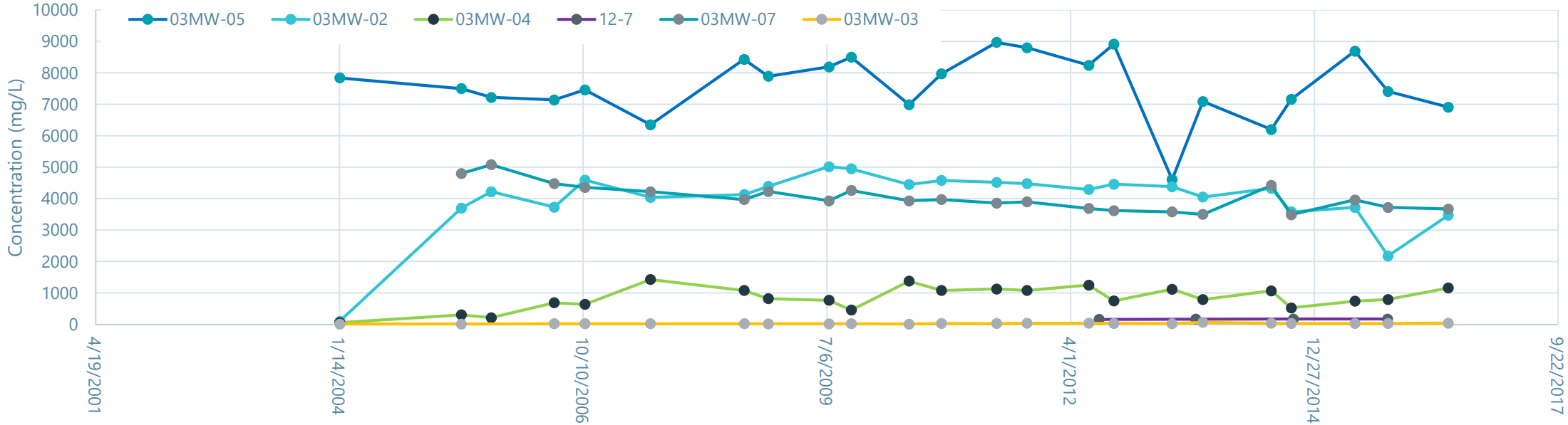
Reporting Requirements

The approval holder shall submit a Groundwater Monitoring Update to the Director on or before August 31

The approval holder shall submit a Groundwater Monitoring Report to the Director, according to the following schedule, unless otherwise authorised in writing by the Director:

(a) the first Groundwater Monitoring Report on or before August 31, 2022; and

(b) the next Groundwater Monitoring Report on or before August 31, 2029.



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Considerations Moving Forward

Key Considerations

- ✓ Phase I environmental site assessment
- ✓ Product Review and Supply Chain
- ✓ Review company's disposal practices
- ✓ Review any contracts with chemical suppliers and customers
- ✓ Review of worker injury claims or litigation
- ✓ Transactional Risks

Develop Your Strategy and Be Prepared

Always have a plan

Scale it to meet the needs

Revisit often

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Check us out…
11:15 to 11:45 (Beatty)

Now what? Prioritizing your Emerging Contaminants Portfolio

Thank you!

Shalene Thomas, VP
Global Emerging Contaminants Program Manager
Minneapolis, MN

- 23 years of experience in environmental investigation, risk assessment and communication
- 13 years experience with PFAS
- Co-leader for ITRC PFAS AFFF sub-team
- Technical reviewer for PFAS SIs in more than two dozen different States and 9 of 10 EPA regions
- Contributing author to NGWA PFAS BMPs
- NFPA Research Foundation PFAS Technical Panel

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- 17 years of experience in environmental assessment, contamination risk assessment and hydrogeology
- Contributing author to AER contamination management manual and EPEA groundwater monitoring requirements
- Experienced in design and review of groundwater monitoring programs for operational facilities and contamination remediation programs

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Wood PFAS Overview- Examples of our work

AFFF Study- Informing Policy
https://echa.europa.eu/documents/10162/28801697/pfas_flourine-free_alternatives_fire_fighting_en.pdf/d5b24e2a-d027-0168-cdd8-f723c675fa98

Remediation and Treatment-Former Pease Air Force Base
https://www.woodplc.com/news/2020/wood-pfas-remediation-project-at-former-us-military-base-receives-national-recognition

Drinking Water- State of MN vs 3M- $850M settlement
https://3msettlement.state.mn.us/DrinkingWaterSupply

PFAS Risk Screening and Assessment
https://www.defence.gov.au/Environment/PFAS/Lavarack/publications.asp

R&D- Environmental Security Technology Certification Program(ESTCP)
https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/ER18-5015/(language)/eng-US

R&D- Strategic Environmental Research and Development Program(SERDP) https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Emerging-Issues/ER18-1306