POETs for PFAS: Lessons Learned and Emerging Concerns from Monitoring >10,000 Private Drinking Water Wells

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Agenda

1. POETs
2. POUTs
3. Scenarios and Sequencing
4. Decision Matrix
5. Initial Response Actions
6. System Design
7. Transition to Municipal Water Line
8. Summary of Lessons Learned
9. Questions We Promised to Answer!

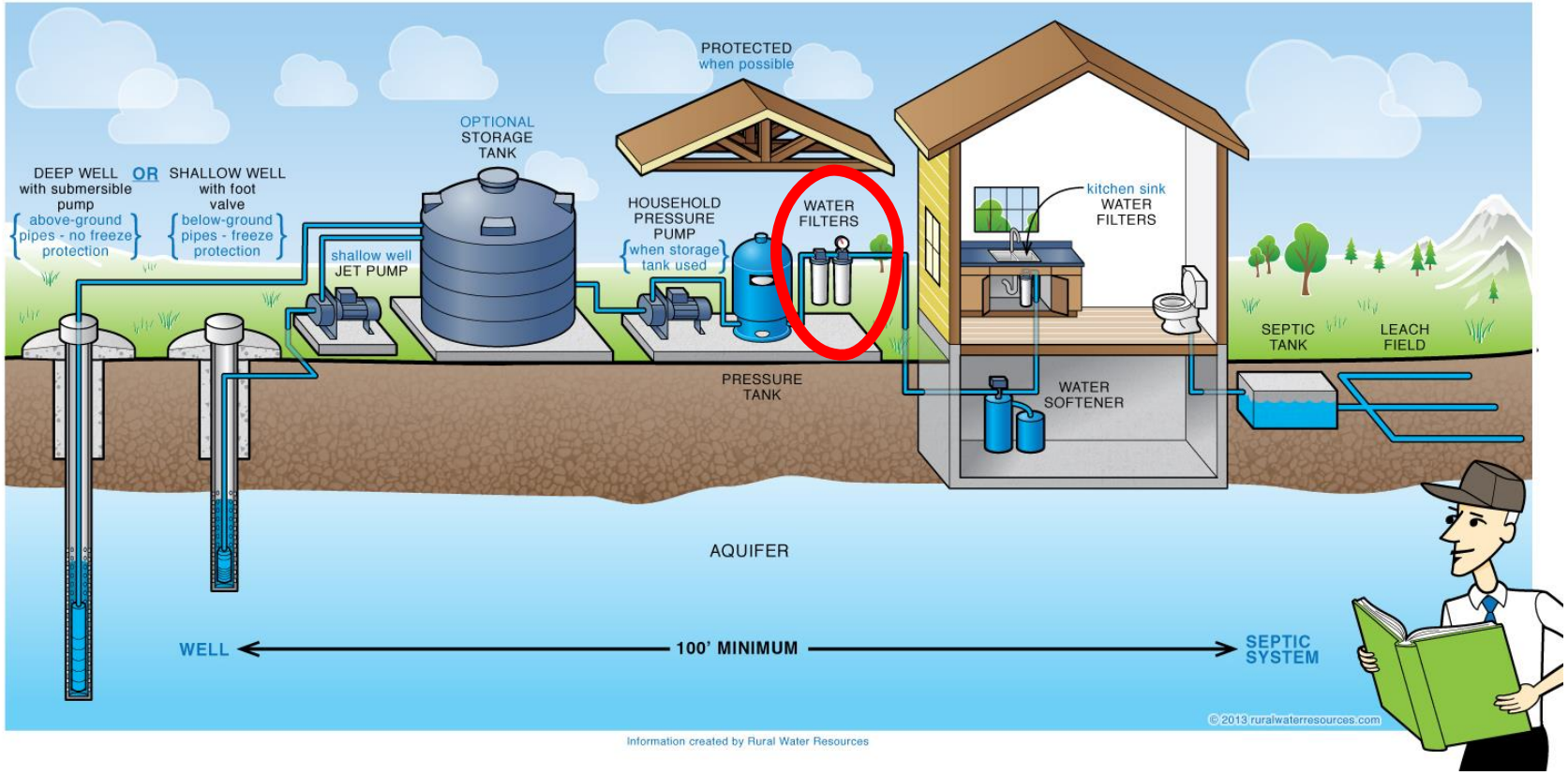
Focus

- Portfolio PFAS POET management
- Proactive vs. reactive management
- Practical considerations
- Identify difficult decision points & implications
- Cover initial threat to successful POET management

Limitations

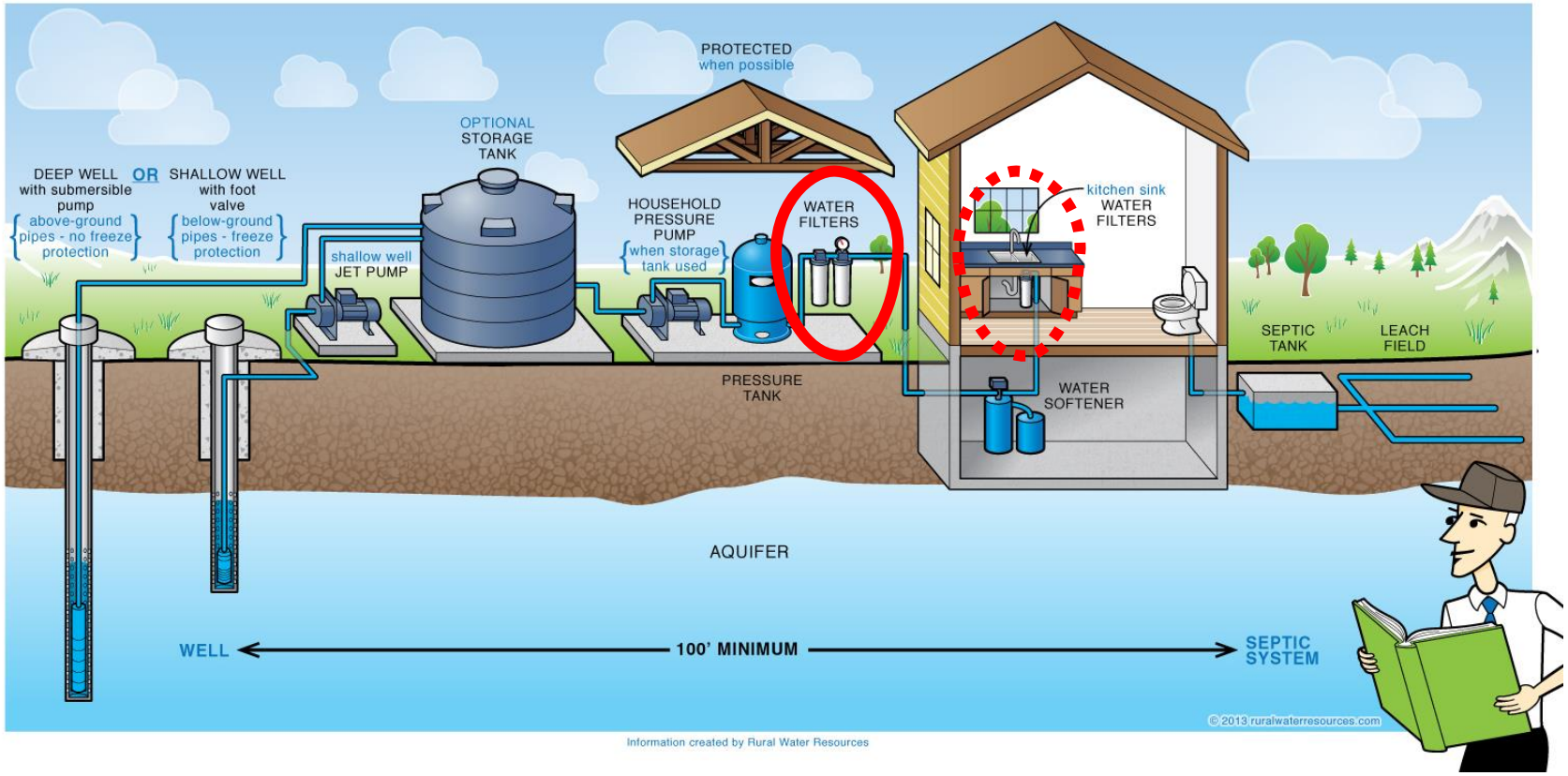
- Confidential clients
- Previous/Ongoing litigation
- Trigger new litigation?
- Geographic considerations
- Will not be a big data dump

POETs: Point of *Entry* Treatment Systems



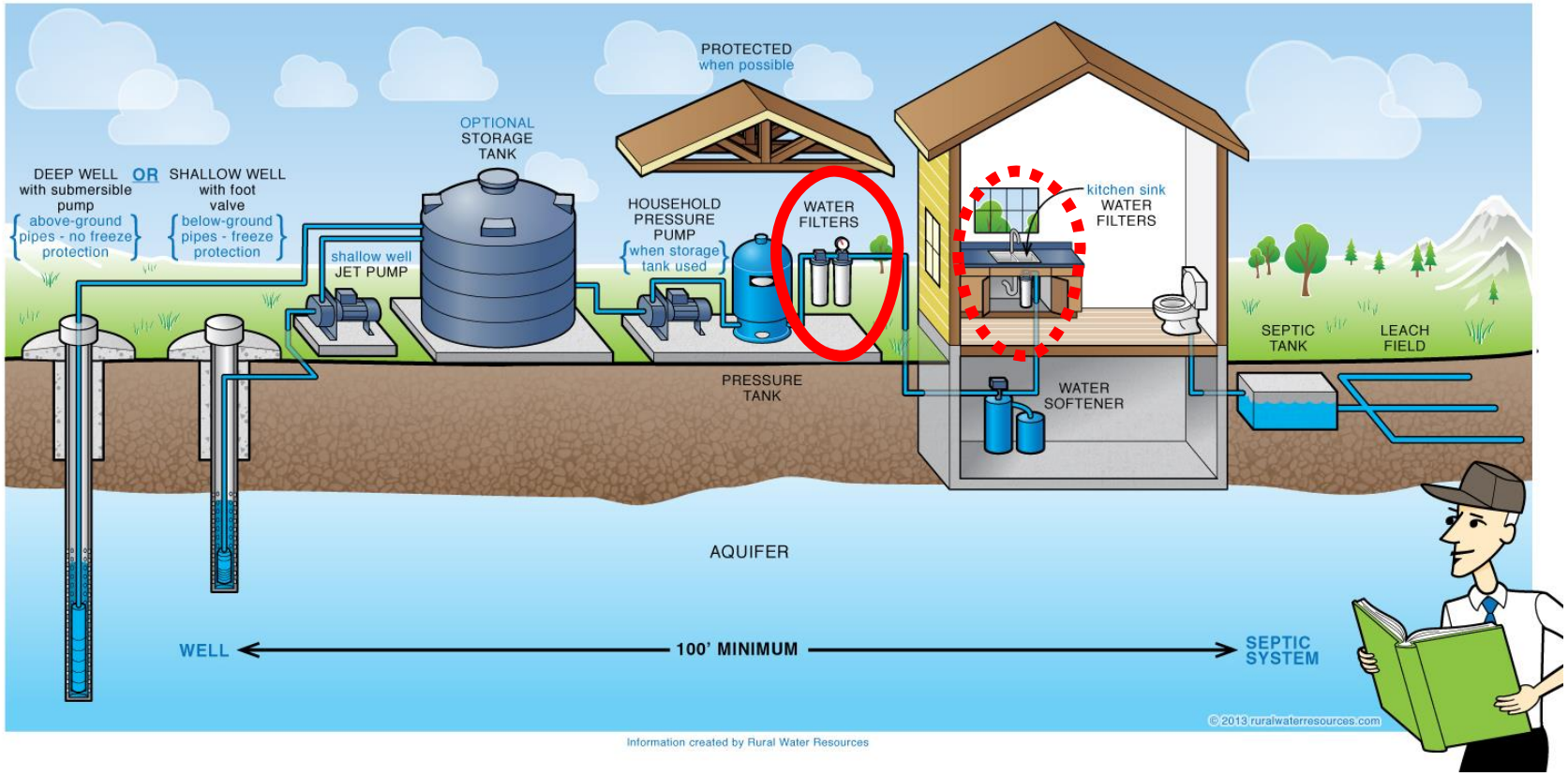
- Treats PFAS in **primary supply line** from supply well
- **Cold water treated** & delivered to home system and to hot water tank
- Relies on: GAC, IX resins, or RO
- Successful treatment is typically confirmed at effluent, this is **not the ingestion point**

POETs: Point of *Entry* Treatment Systems



- PFAS can potentially **stick/adsorb** to many system components
- PFAS equilibrium will change and can potentially **desorb into water**
- **System and pressure tank components** can contribute PFAS
- **Install a POUT!**

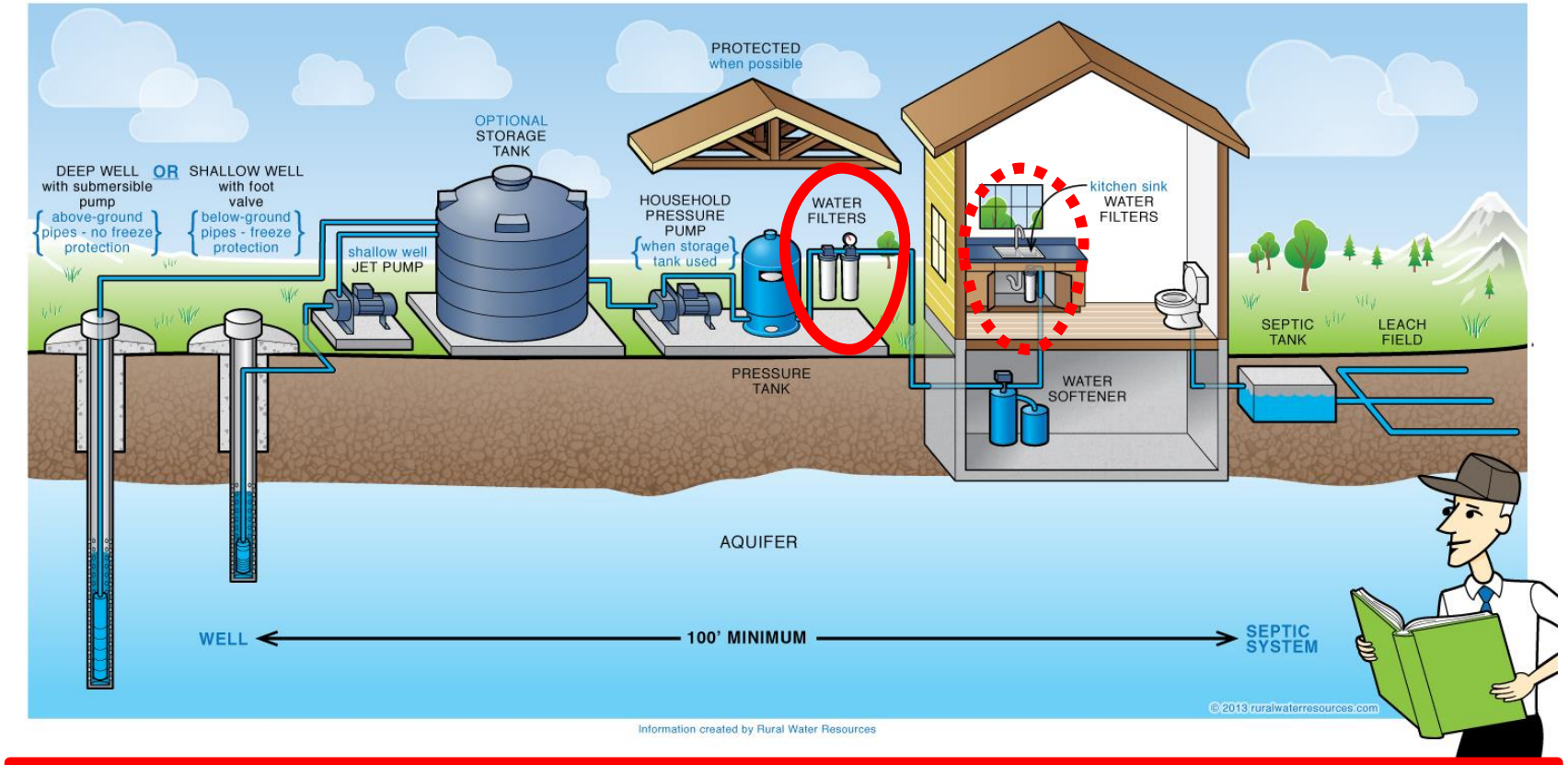
POUTs: Point of *USE* Treatment Systems



- Treats PFAS at the point of use **on the cold-water line only**
- Typically installed at kitchen sink, also may be considered for bathroom sinks
- **Cold water tap sample** confirms treatment

- Typically rely on one of the following for treatment: GAC, RO, or IX
- Hot water tap samples not always collected!

POUTs: Point of *USE* Treatment Systems



- Sample **hot water tap**
- Solutions:
  - **Flush** the system
  - **Replace system** components (e.*g.*, glass-lined hot water tank)

Scenarios and Sequencing – Before POET

1. Concentrations are **similar** at kitchen sink and well
   - **Probably no sticking/no home system contribution**

2. Concentrations at **kitchen sink** are **higher** than well
   - **Desorption and/or home system contribution**

3. Concentrations at **kitchen sink** are **lower** than well
   - **Sticking to home system components**

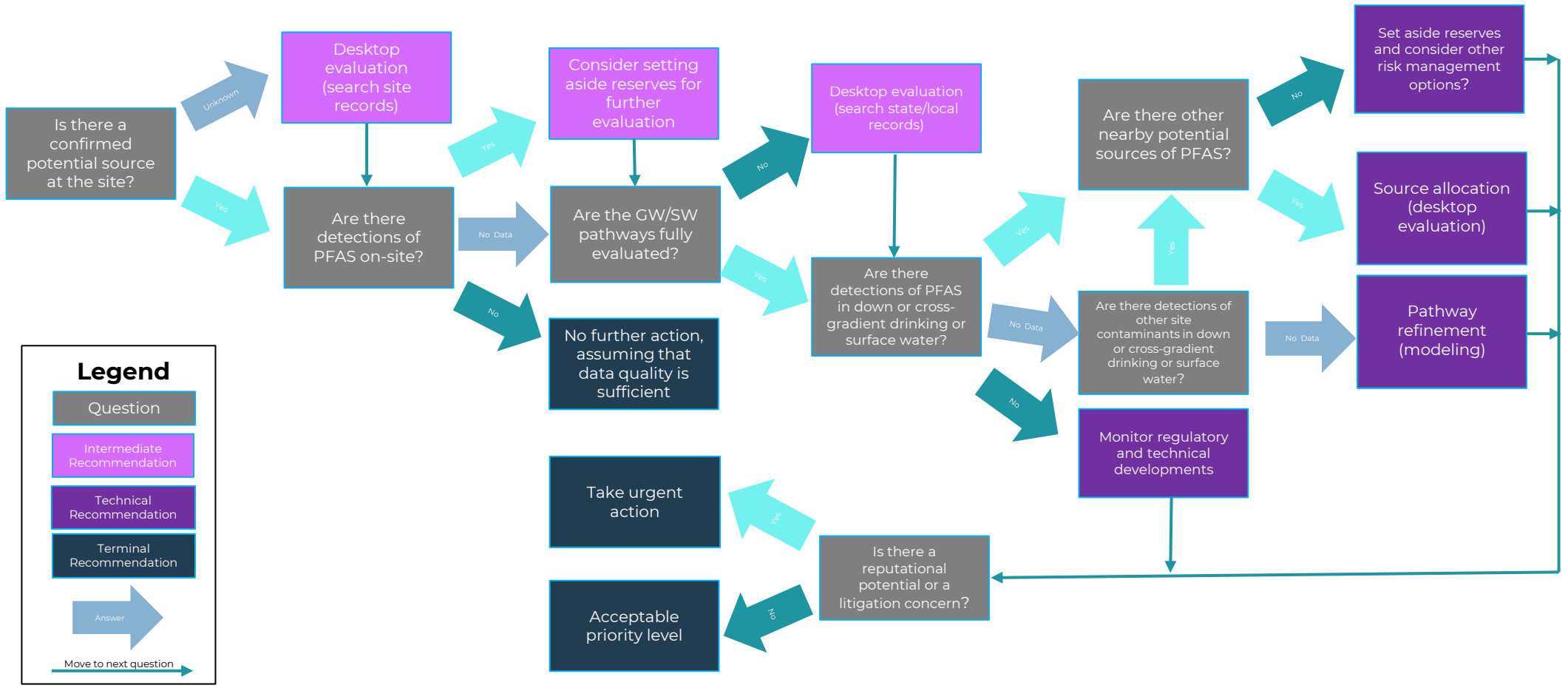
Scenarios and Sequencing – After POET

1. Concentrations are **similar** in effluent and at kitchen sink
   - **No sticking/no component** contribution

2. Concentrations at **kitchen sink** are **higher** than effluent
   - **Desorption and/or home system** contribution

3. **Concentrations at effluent are higher than influent or mid-point!**
   - **NSF Certified or equivalent systems components can contribute PFAS!**

Decision Matrix



Initial Response Actions – Threat of Impact to DW

Even before sampling:

- **Notify** legal and public relations
- Contact potentially **affected parties**
- Offer **bottled water** at first contact!
- Follow the Decision Matrix or develop one and initiate an **offsite source study**
- Conduct offsite drinking water well **survey** using all available resources, including door to door if warranted

Sampling and analysis:

- Identify any/all **regulatory requirements**
- Consider anticipated **future requirements**
- Include **all method analytes**
- Consider any **forensics analysis** driven by offsite sources identifications
- Samples should be collected directly from the well, consider **sampling at the hot and cold-water taps** (e.g., kitchen sink)
- **Confirm non-detects**

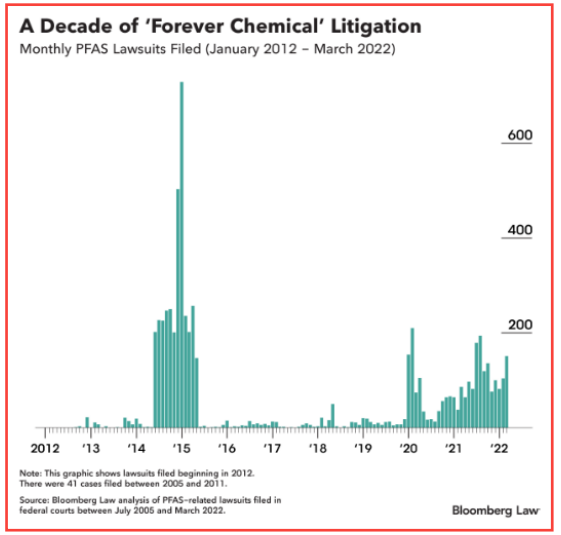
System Design – Triggers

1. If PFAS DW criteria exist **any exceedances should trigger** treatment

2. **No criteria** - what concentration should trigger treatment?
   - Any detection of a regulated or unregulated PFAS
   - Default to screening level or guidance in your location
   - Treatment triggered at ½ of applicable criteria
   - Account for seasonal data variability
   - Anticipate changes in criteria and/or more PFAS analytes

3. **At-risk** wells nearby

4. **Litigation avoidance**

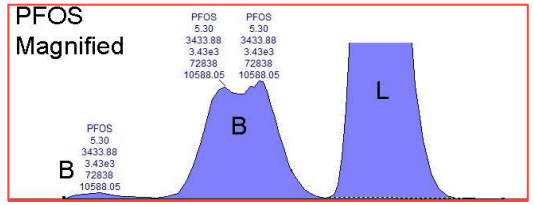


System Design – Goals

- Share details to maintain **reasonable expectations** with the affected parties
    - You determine the **risk tolerance** and the level of conversation
- Is a Below Detection Limit (BDL) goal feasible for all PFAS?
    - How much are you willing to **pay**?
- What if you identified another nearby Source? Implications?
    - **Same goals** as if you are the sole source
    - Later there is going to be **an allocation**!

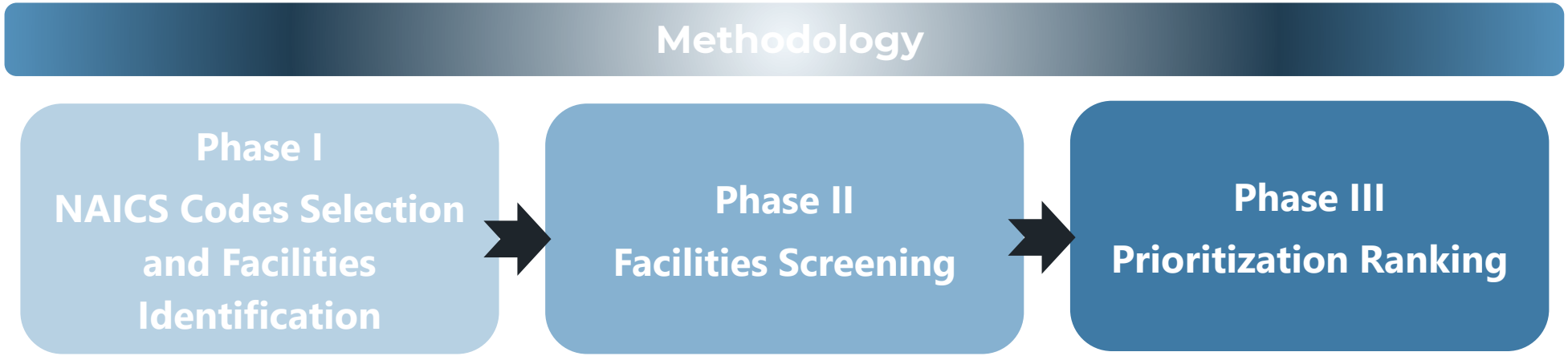
System Design – Concurrent Offsite Source Evaluation

- Unless your site is the only viable source then **there is a high potential for other nearby sources** that:
  - Could be distinguishable from the source on your Site
  - May be contributing to receptors



- A concurrent **offsite source evaluation** is highly recommended using:
  - Information on sewers/septic drain fields
  - Information on State/Local websites
  - North American Industry Classification System (NAICS) codes tied to PFAS users

System Design – Concurrent Offsite Source Evaluation



ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 372

[EPA–HQ–TRI–2019–0375; FRL–10002–70]

RIN 2070–AK51

Addition of Certain Per- and Polyfluoroalkyl Substances; Community Right-to-Know Toxic Chemical Release Reporting

AGENCY: Environmental Protection Agency (EPA).

ACTION: Advance notice of proposed rulemaking.

otherwise use PFAS. The following list of North American Industrial Classification System (NAICS) codes is not intended to be exhaustive, but rather provides a guide to help readers determine whether this document applies to them. Potentially affected entities may include:

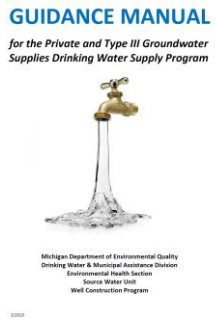
- Facilities included in the following NAICS manufacturing codes (corresponding to Standard Industrial Classification (SIC) codes 20 through 39): 311*, 312*, 313*, 314*, 315*, 316, 321, 322, 323*, 324, 325*, 326*, 327, 331, 332, 333, 334*, 335*, 336, 337*, 339*, 111998*, 211130*, 212324*, 212325*, 212393*, 212399*, 488390*, 511110, 511120, 511130, 511140*, 511191, 511199, 512230*, 512250*, 519130*, 541713*, 541715* or 811490*. *Exceptions and/or limitations exist for these NAICS codes.
- Facilities included in the following NAICS codes (corresponding to SIC codes other than SIC codes 20 through 39): 212111, 212112, 212113 (corresponds to SIC code 12, Coal Mining (except 1241)); or 212221, 212222, 212230, 212299 (corresponds to SIC code 10, Metal Mining (except 1011, 1081, and 1094)); or 221111, 221112, 221113, 221118, 221121, 221122, 221330 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce) (corresponds to SIC codes 4911, 4931, and 4939, Electric Utilities); or 424690, 425110, 425120 (limited to facilities previously classified in SIC code 5169, Chemicals and Allied Products, Not Elsewhere Classified); or 424710 (corresponds to SIC code 5171, Petroleum Bulk Terminals and Plants); or 562112 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis (previously classified under SIC code 7389, Business Services, NEC)); or 562211, 562212, 562213, 562219, 562920 (limited to facilities regulated under the Resource Conservation and Recovery Act, subtitle C, 42 U.S.C. 6921 *et seq.*) (corresponds to SIC code 4953, Refuse Systems).
- Federal facilities.

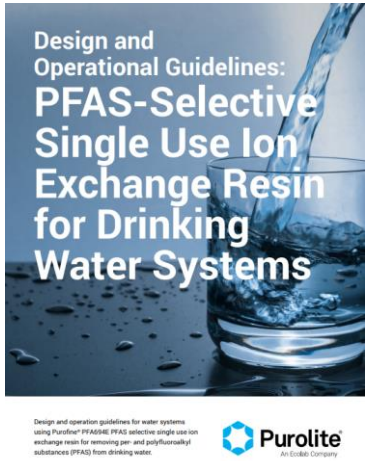
System Design – Predesign Monitoring

- **All exceedances** should be **confirmed** via re-sampling/analysis
- Select **pre-design monitoring parameters** consistent with target or preferred treatment option (e.g., GAC vs. IX vs. RO)
- Consider potential for **co-contaminants** that have not been analyzed (could cause premature break-through)
- **Additional analyses** in all wells may be too costly and is likely unnecessary in all samples – **by hydrogeologic zone**

System Design – Guidance Manuals and Design Guides

- Great resources to consider – should **not** result in a "**cookie cutter**" design approach





System Design – POETs Key Design Considerations

- Flow rate
- Available water pressure (e.g., residential RO pressure limited)
- Co-contaminants
- POET only vs. POET + POUT
- Backwashing (e.g., GAC) or reject requirements (e.g., RO)
- **Treatment goals and objectives**

System Design – POUTs Key Design Considerations

- **Risks should drive placement** - Kitchen sink only, bathrooms, laundry room, livestock watering areas

- **A POUT** may be needed to remove adsorbed/residual PFAS in home for **an extended period**!

- Higher influent concentrations scenarios could require **additional measures** including:

  - ➢ Flushing the system

  - ➢ Replacing components

(e.g., glass-lined hot water tank)

System Design – Best Available Treatment Technologies

1. GAC

- Pros – Most available, longest/most experience
- Cons – Lower capacity to remove short chain PFAS

2. Single use IX

- Pros – Adsorption capacity & short chain removal, smaller bed volume (less space required)
- Cons – Still struggles w/ short chains, sensitive to geochemistry, can impart taste (low flow)

3. RO

- Pros – Highest removal capacity
- Cons – High reject rate, limited disposal options, highest O&M

System Design – Operations and Maintenance

1. Monitoring costs can potentially **exceed disposal costs**

2. Use of **NSF certified** systems could result in annual media replacement with **reduced performance monitoring,** likely the **most cost effective**

3. **Tiered management** may be warranted (i.e., more frequent monitoring and media replacement) on **higher concentration** systems

4. **Biotransformation** is a concern!

Transition to Municipal Water Line

- Sample influent to house to **detect or confirm PFAS in municipal water**
- **Sample at kitchen sink** to confirm that there is no PFAS contribution from system component/desorption
- **Abandon the supply well** in accordance with local/state requirements
- **Remove POETs** and take them back with you!

Summary of Lessons Learned

1. Use a consistent **decision matrix** and be proactive on sites that pose threat to drinking water

2. Conduct **offsite response** actions and offsite source evaluation concurrently

3. Develop **triggers and goals** and apply them **consistently**

4. Always **sample at the exposure point** and respond accordingly with treatment

5. NSF Certified or equivalent systems **components can contribute PFAS**

6. Sticking and component contribution should be evaluated on future and existing systems, may require **POUT for extended period** – POET + POUT provides > protection

Questions We Promised to Answer!

1. What concentration should trigger treatment?
2. Should bottled water always be offered?
3. Does PFAS sorb to and subsequently desorb from home water systems?
4. What monitoring should be done following POET installation or even after municipal water is added?
5. What analytes should be monitored?
6. Is biotransformation a concern?
7. Is it important to be consistent across different sites?
8. What are best practices when removing treatment equipment?

https://depositphotos.com/vector/the-water-tried-to-kill-us-70282491.html

Questions?

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