

**Innovation Applied: Streamlining Access  
and Approvals of Treatment Technologies**

University of  
Massachusetts  
Amherst



# Year One Activity Report Out

# Project Team

## Faculty

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# UMass Team Activities

- **Interviewing stakeholders from state drinking water programs**
  - Learning about processes for approving treatment technologies (some focus on PFAS)
  - Identifying commonalities and differences in approaches
  - Identifying areas for deeper study
- **Performed coding and thematic analysis**
- **Collecting state specific guidance on PFAS regulations and treatment**



# Interviews

- **Semi-structured interviews**
  - Mix of predetermined and ‘in the moment’ questions to participants
  - 13 states
- **Approved by UMass Institutional Review Board (IRB)**

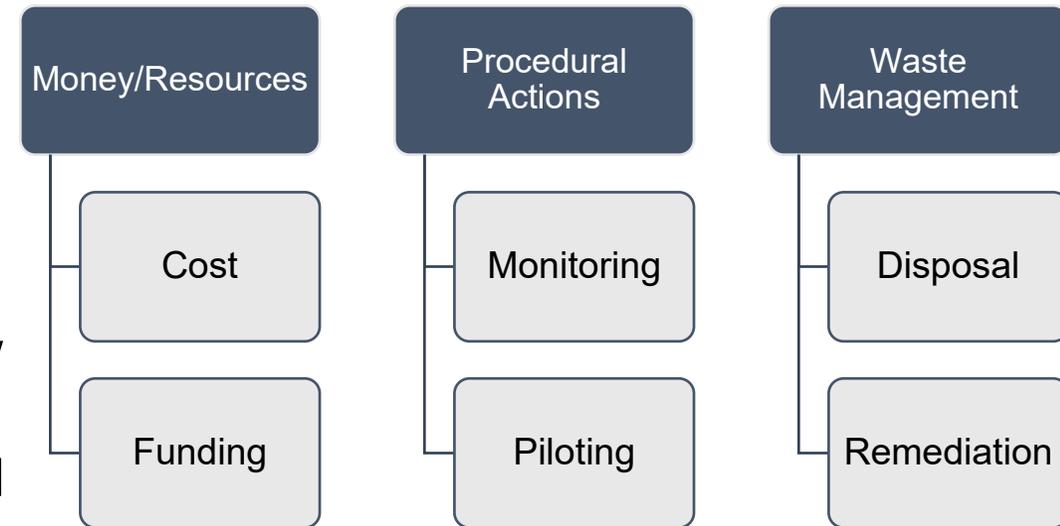


- 1) What constitutes an “innovative technology” in your state?
- 2) Are there specific guidelines based on either the size of the system (population) or the type of PWS (CWS vs. NTNCWS vs. TNCWS)?
- 3) Is there specific guidance on technologies based on the type of contaminant?
- 4) Are there pilot testing requirements for innovative technologies?
  - a) What do these testing requirements look like?
- 5) What is the process/ set of steps to approve and install an innovative technology in a water system?
  - a) What are the steps in the process (approval, engineering consultation, piloting, permitting, etc.)?
- 6) Are there any case study examples you can share where an innovative technology was implemented?
  - a) Successes and challenges?
- 7) Are there additional sampling/monitoring costs or analyses associated with implementing innovative technologies that are different from what would be required with other technology solutions?
- 8) Regarding PFAS specifically:
  - a) Does your state currently have a guideline/regulation in place or underdevelopment for PFAs?
  - b) Does your state have a strategy specifically for PFAS removal? Are there specific strategies you will or will not approve in water systems?
  - c) How well documented is PFAS contamination in your state? Is there a specific monitoring program?
- 9) Disposal of GAC media with PFAS in it?
- 10) PFAS sampling program in private wells? How are private wells regulated?
- 11) Does the state have specific guidance on POU/POE devices in general as an approach to removing specific contaminants?
- 12) Does the state ever consider other strategies besides treatment such as interconnection or drilling new wells before treatment?

## Predetermined Questions for Interviewees

# Coding and Thematic Analysis

- **Code:** descriptor assigned to a word or phrase from interview notes
- **Theme:** higher level grouping of codes that are related in some way
- **Coding approach**
  - Inductive - codes arise directly from interview responses
  - Hierarchical – helps to organize codes based on how they relate to one another. Allows for different levels of specificity



Example: Themes and Codes

# What Constitutes an “Innovative Technology” in Your State?

- Often not strictly defined
- No universal definition
- Some states don't use this term/designation
- Common factors – not a BAT, new application of known technology (preference), not in regulations or manuals
- Lean conservative towards accepting new approaches
- States look to outside guidance with authority
  - 10SS, ASDWA, EPA
- Existing data from other systems and other outside documentation are essential
- Requirement of piloting often mentioned
- Important procedural actions
  - piloting, monitoring, reporting



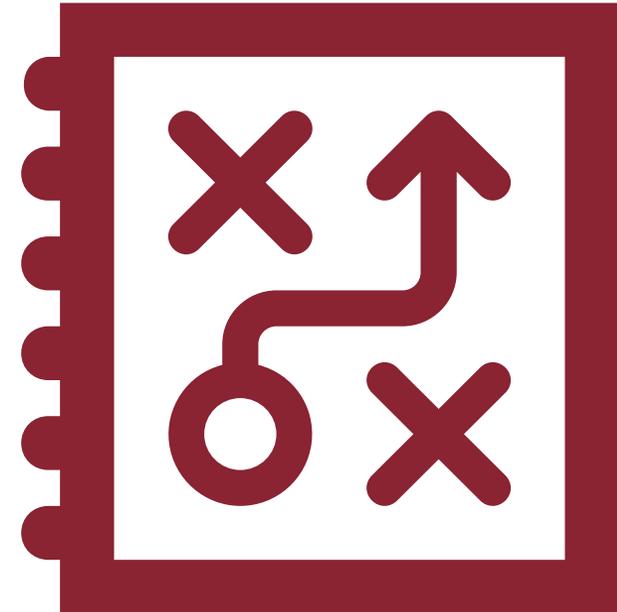
# What Does This Communicate to Us?

- **The definition we use for ‘innovative technology’ drives the regulatory approach and associated challenges**
- **To effectively define this term, we need to identify and be specific about the processes associated with it by state stakeholders**
  - e.g. piloting, monitoring, reporting



# Describing Processes for Approval of Innovative Tech

- **Procedural Descriptors**
  - Case-by-case, flexible
  - Don't want to be overly restrictive
  - No cookie cutter approach
- **System Characteristic Based Factors**
  - Some states have different standards/processes for different water system sizes and types
    - Primarily mention different approach for small systems
    - Others have a uniform process
  - Large systems typically pilot before small systems
  - TMF\* capacity, cost, affordability dependent
- **Mix between case-by-case approach and uniform approach for different contaminants**



# Implications for This Project

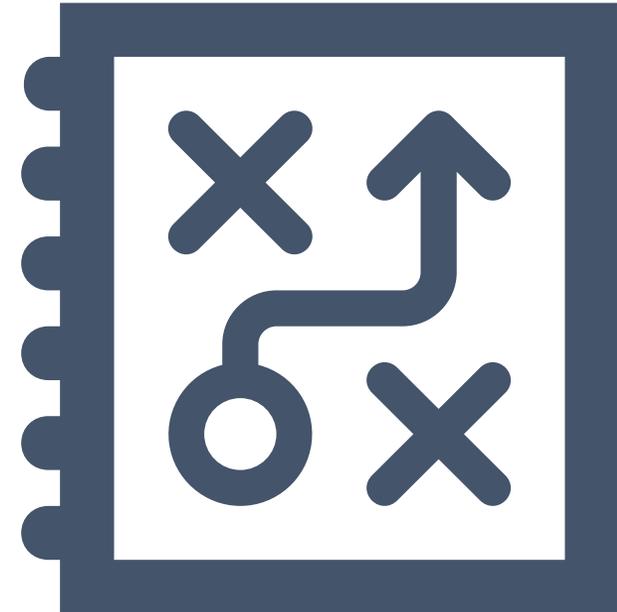
## What does 'case-by-case' mean?

- Is each case evaluated as a unique scenario?
- Or are specific system sizes (small vs large) and/or system types (e.g. CWS vs. TNCWS vs. NTNCWS) combinations considered to be “cases”?

## What are the factors that lead to using a case-by-case approach compared to a uniform approach?

If dependency on system size and type is important, how does this get incorporated into multi-state standards?

- What would reaching consensus look like for this?



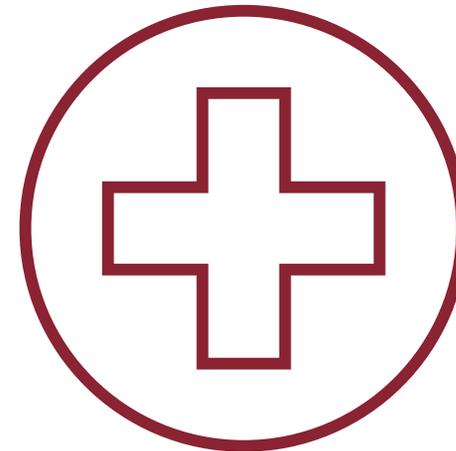
# Governance and a Key Concern

- **Standards in general**
  - Many states defer to federal/EPA or other standards
  - Some exceed federal regulations
  - Differing requirements for different system types or source waters
- **Concerns with simultaneous compliance**

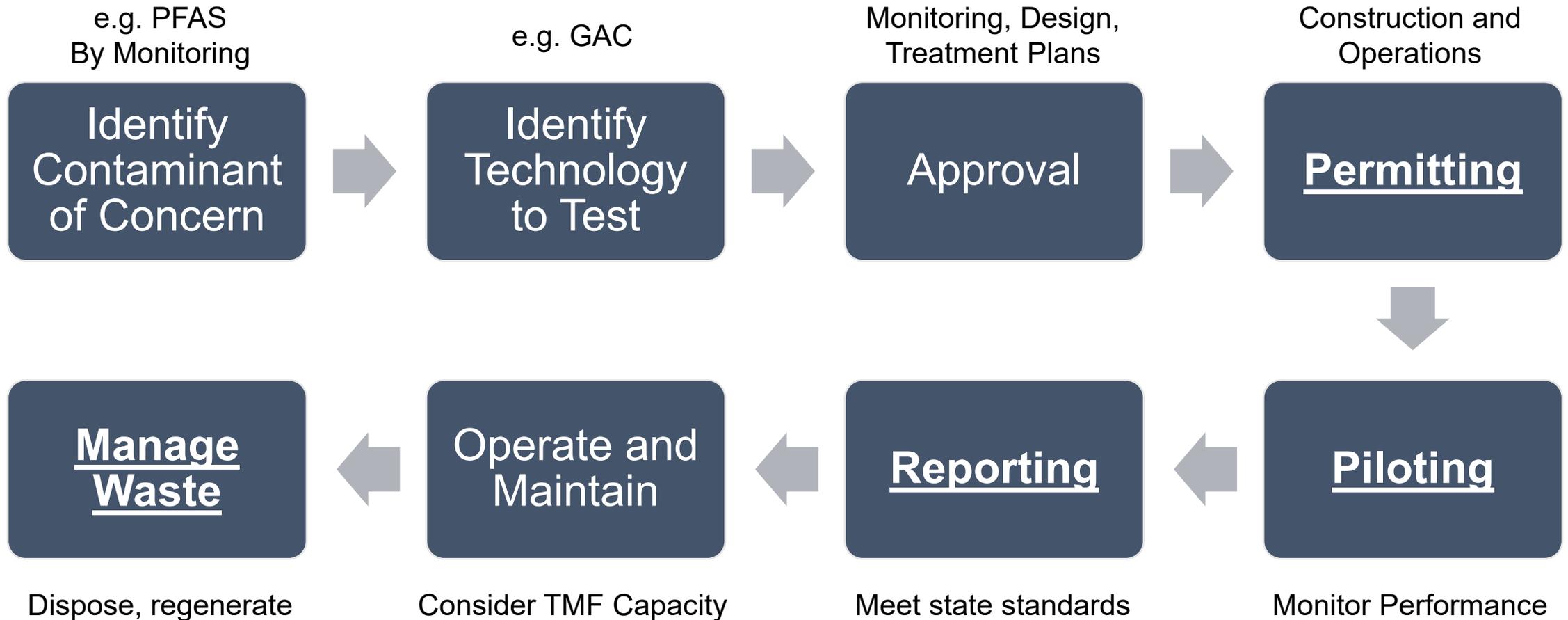


# Governance Approach to PFAS

- **Want to follow EPA standards**
  - Approach described as “match federal”
- **Varying levels of enforceability for PFAS regulations**
- **Health advisory levels are followed or established**
  - Protection of public health can drive requirements for monitoring, treatment



# Approving and Installing an Innovative Technology



# Identify Contaminants

- **Monitoring – contaminant presence**
  - UCMR process leads to sampling that wouldn't be done otherwise
  - States will monitor when money is given
- **Contaminants mentioned during interviews**
  - PFAS
  - Arsenic
  - Nitrate
  - Manganese
  - Radionuclides



# Identifying Technologies – How? Knowledge Transfer

- **States look to EPA for guidance**
- **Regional sharing – e.g. EPA region or New England**
- **10SS**
- **Interstate requests for outside documentation**
- **NSF/ANSI**
- **Vendor and engineering reports**



# Knowledge Transfer (Data)

- **Consensus is that data (from other pilots, installations) are needed to more effectively implement innovative technologies**
- **States want good data collection**
- **States sometimes use data from other states/sources as justification for use of an innovative technology**
- **How do we facilitate communication?**
  - “What are the pathways to get people connected?”

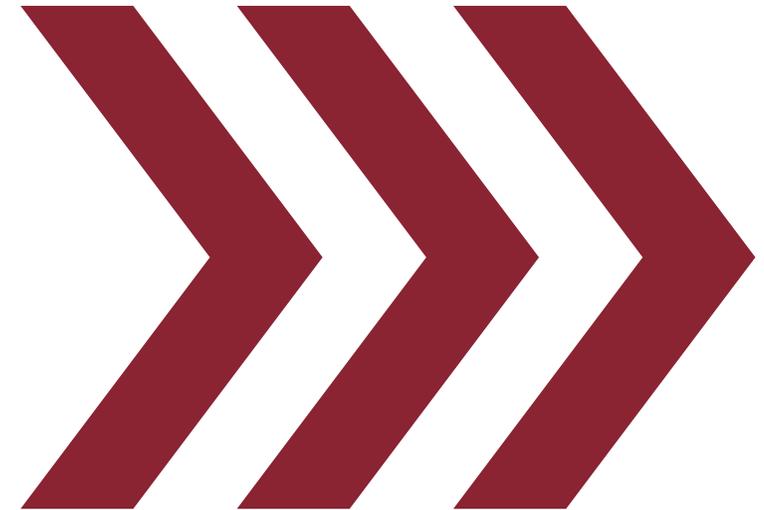


# How Do We Transfer Knowledge More Effectively and How Can This Drive Down the Resource Burden?

- **Many states interviewed indicate that engineering reports are required after pilot implementations. Where do these reports go? Can they be shared in a place of common access?**
- **Likewise, where does data from pilots go? Can this data be shared in a place of common access?**
- **What would be the base requirements for reports and/or data for a state to consider accepting outside knowledge as a source of information for implementation of innovative technologies?**
- **Are there benefits to regional approaches for knowledge transfer processes?**

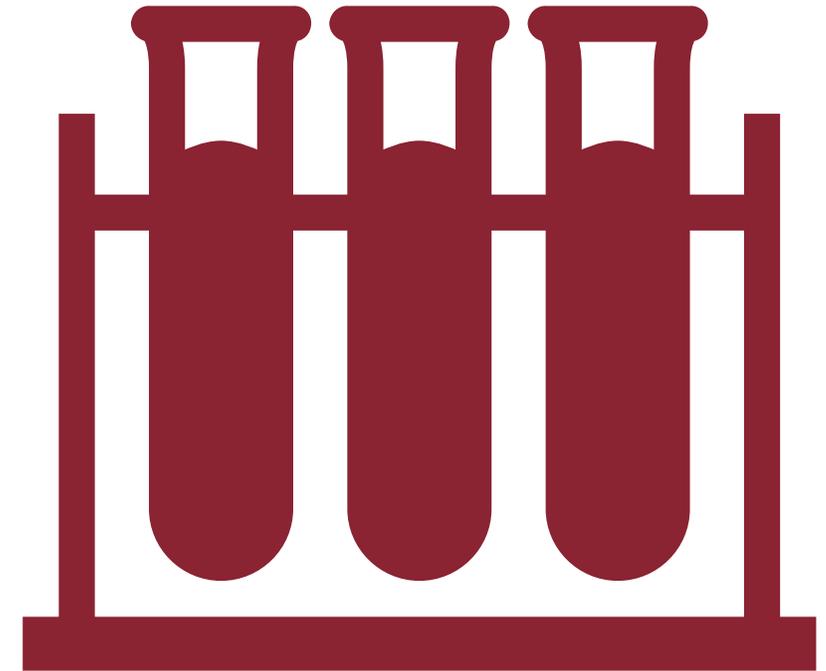
# Permitting, Reporting, Approval

- **Permitting**
  - For construction and/or operation
  - Some states don't or can't require permits
- **Reporting**
  - States specify need for engineering reports
  - Reports required after piloting
- **Approval**
  - Reports must be approved by state
  - States approve design & treatment plans
  - States approve monitoring required during piloting



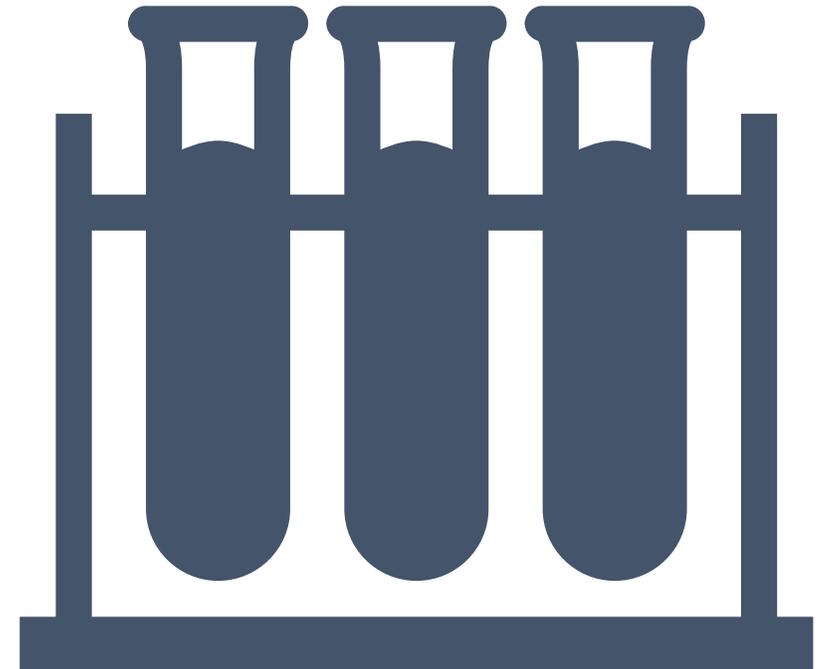
# Piloting for Innovative Technologies

- **Most states interviewed indicated that piloting is required or at least highly recommended when implementing innovative technology**
- **Reasons for piloting – new media, not a BAT, DPR, not conventional, new contaminant**
- **Often required along with reporting requirements**
- **Technologies most mentioned for PFAS – GAC and IX**



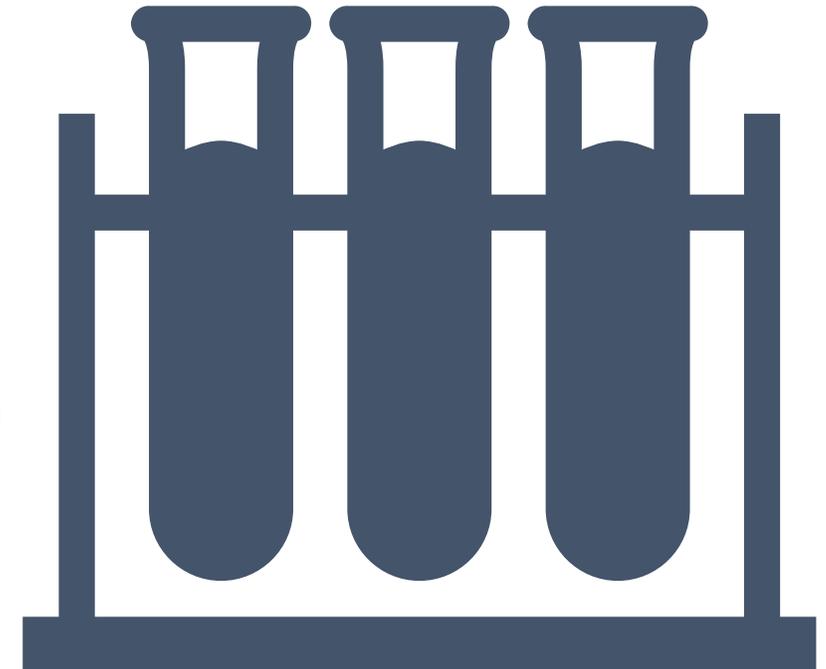
# Further Points on Piloting

- **Challenges include system size, determining success, lack of resources, and technology used**
- **Can be required even if a technology has been used before**
- **Bench scales pilots can be used when resource limited**
- **Phrase “case-by-case” abounds**



# Making Pilots with Broader Impact

- **What are the details of piloting requirements of different states?**
  - How can these requirements be detailed in such a way to facilitate knowledge sharing between states or regions?
- **What are the criteria for evaluating a pilot? What makes a pilot “successful”?**
  - Adequacy, quantity of monitoring data?
  - Operational descriptions?
  - Something else?



# Let's Make It Happen!

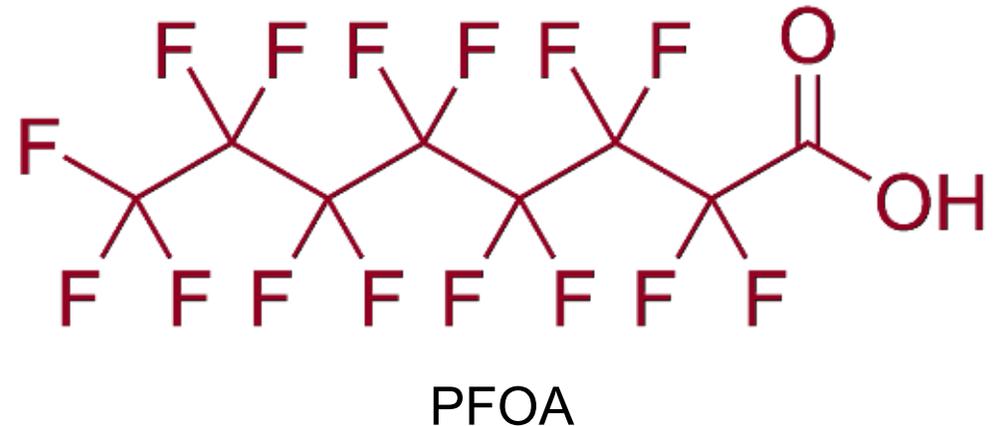
- **Funding**
  - Mechanisms – EPA, state revolving funds, responsible parties (e.g. DOD, manufacturers)
  - Some difference into whether funds are for private wells or for PWS
- **Cost**
  - Key areas of concern are disposal of media, monitoring, and O&M
  - Costs relating to waste were often mentioned
  - Cost of monitoring can be prohibitive
  - Economy of scale matters – difficulties for small systems



# Regarding PFAS Specifically

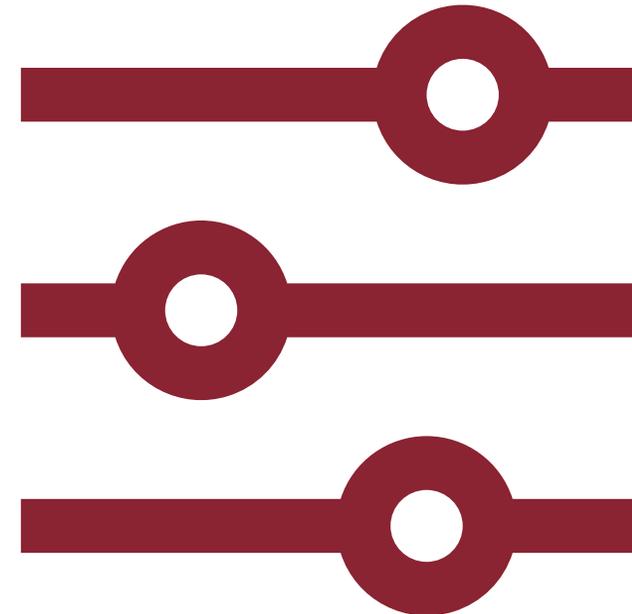
Note: Interviews conducted before June 15, 2022  
(Interim Updated PFOA and PFOS Health Advisories)

- **States want to follow EPA standards**
  - Go with what EPA says, many don't want to be more stringent
- **There are varying levels of enforceability for PFAS regulations**
- **GAC and IX seem to be preferred treatment technologies**
- **Geographic factors: airports, military installations**
- **States establish health advisories when PFAS is detected through monitoring**
  - Some revealed through UCMR process



# Options Besides Centralized Treatment

- **Consolidation seen as a good option sometimes, but can be cost prohibitive**
- **Bottled water in some cases (short-term)**
- **Source blending or switching if possible**
- **Point of Use/Point of Entry (POU/E)**
  - States generally want to avoid
  - Hard to achieve compliance with SDWA
  - O&M a concern
  - Application in some places, but not widespread by any means
  - Some mention specifically not for PFAS, at least yet



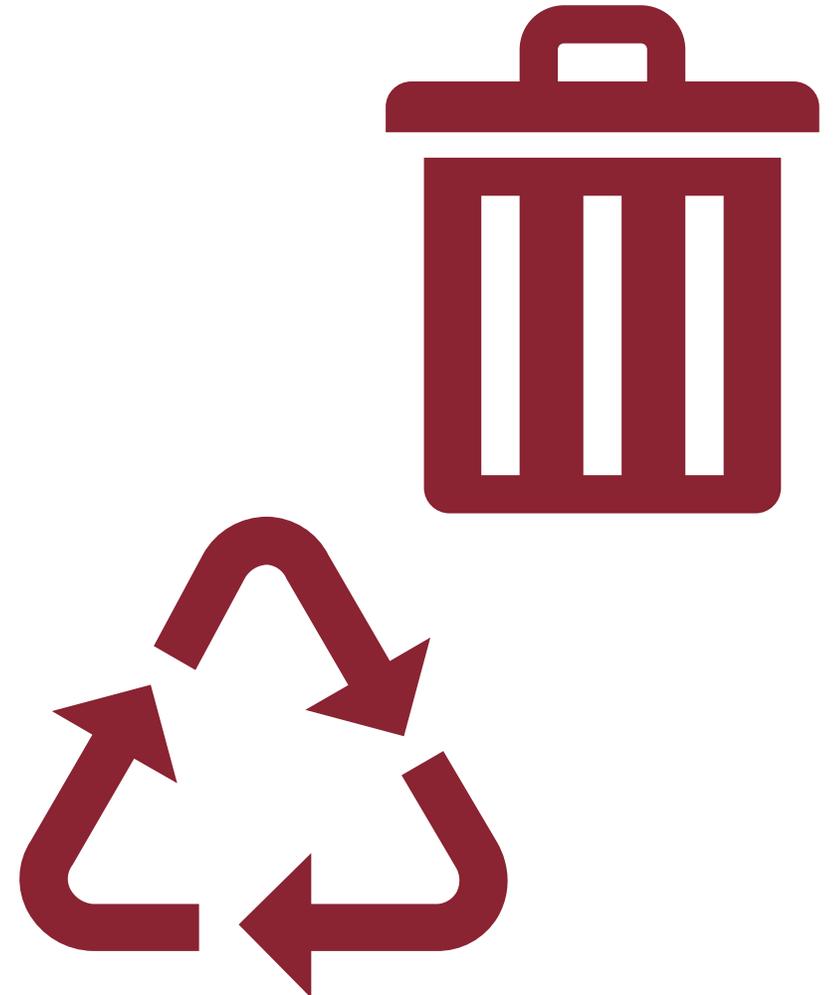
# Private Wells (Self-Supply) and Privately Owned PWS

- **Funding for PFAS monitoring leans towards private wells**
- **Lack ability to mandate monitoring for self-supply**
- **For Privately Owned PWS**
  - Lean towards not allowing POU/E due to lack of TMF capacity and O&M concerns



# Waste Management for PFAS

- **Disposal, regeneration, backwash, reject water**
- **Mentioned by most states in terms of disposal**
- **Hazard waste status variable and matters largely**
  - Where is it going? Shipping?
  - **August 26<sup>th</sup> – EPA Proposed Designation of PFOA and PFOS as CERCLA Hazardous Substances**
- **Concern surrounding POU systems in many cases**
- **For GAC - Carbon disposal & media changeout**
  - Cooperation with vendors beneficial
- **Cost for waste management is a concern**
- **Arsenic mentioned often as an area of past experience with this issue**

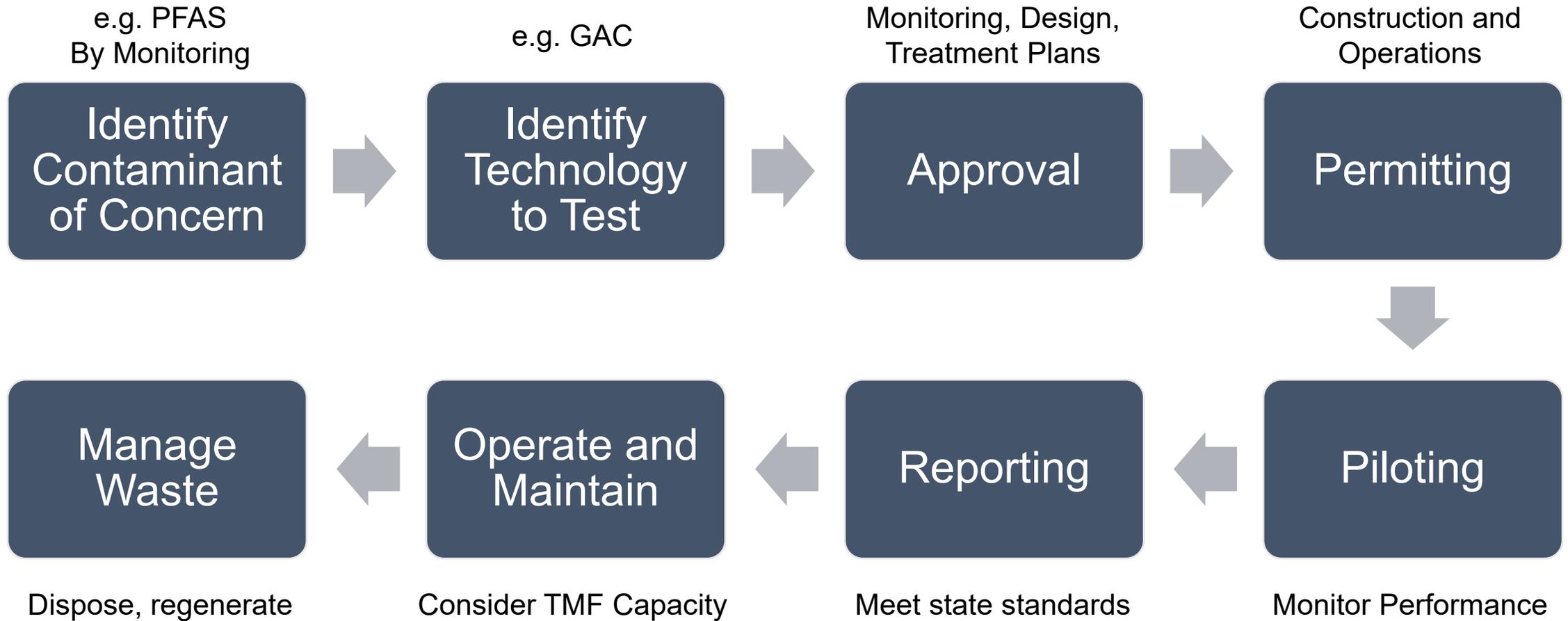


# Waste Management for PFAS

- **How can we use our past experience with managing arsenic in efforts around PFAS?**
- **How can we support states in their handling of waste management?**
  - Guidance?



# Approving and Installing an Innovative Technology



# Facilitating Use of Innovative Technology

- **States want to provide PWS with guidelines for piloting, design, etc.**
- **States also want to provide guidance for homeowners/ private well owners**
- **Can our project outputs help facilitate this further?**



# Next Steps

- **Continue to collect state specific guidance on PFAS regulations and treatment (e.g. GAC)**
- **Compare these documents to each other and information learned from these interviews**



# Final Thoughts

- **The definition we use for ‘innovative technology’ drives the regulatory approach and associated challenges**
- **Questions to consider at the forum and beyond:**
  - What does ‘case-by-case’ mean?
  - What are the requirements for knowledge sharing effectively?
  - What makes a “successful pilot”?
  - How can we support waste management efforts?

QUESTIONS  
&  
ANSWERS

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