

Preparing for PFAS



Operational Strategies to Meet New NPDWR Requirements

IEPA # 19708

April 15, 2024



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Agenda

1. Regulatory Background
2. PFAS in the Environment
3. PFAS in Illinois
4. **Sampling and Reporting**
5. **Treatment and Operations**
6. Looking Forward
7. Q&A



1. Regulatory Background

Policy Finalized After Science

2000 – 2002: EPA recommends voluntary phase-out of PFOA and PFOS

2006: Eight major manufacturers agree to phase out PFOA and PFOS

2009 and 2016: EPA publishes health advisories based on the science available at the time, 70 ng/L in 2016

2021: EPA publishes PFAS Strategic Roadmap

March 2023: Draft rule proposed limiting 6 types of PFAS

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April 2029: MCL and HI compliance effective date



Finalized MCLs and Hazard Index

Compound	Final MCLG	Final MCL (enforceable levels)
PFOA	Zero	4.0 parts per trillion (ppt) (also expressed as ng/L)
PFOS	Zero	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

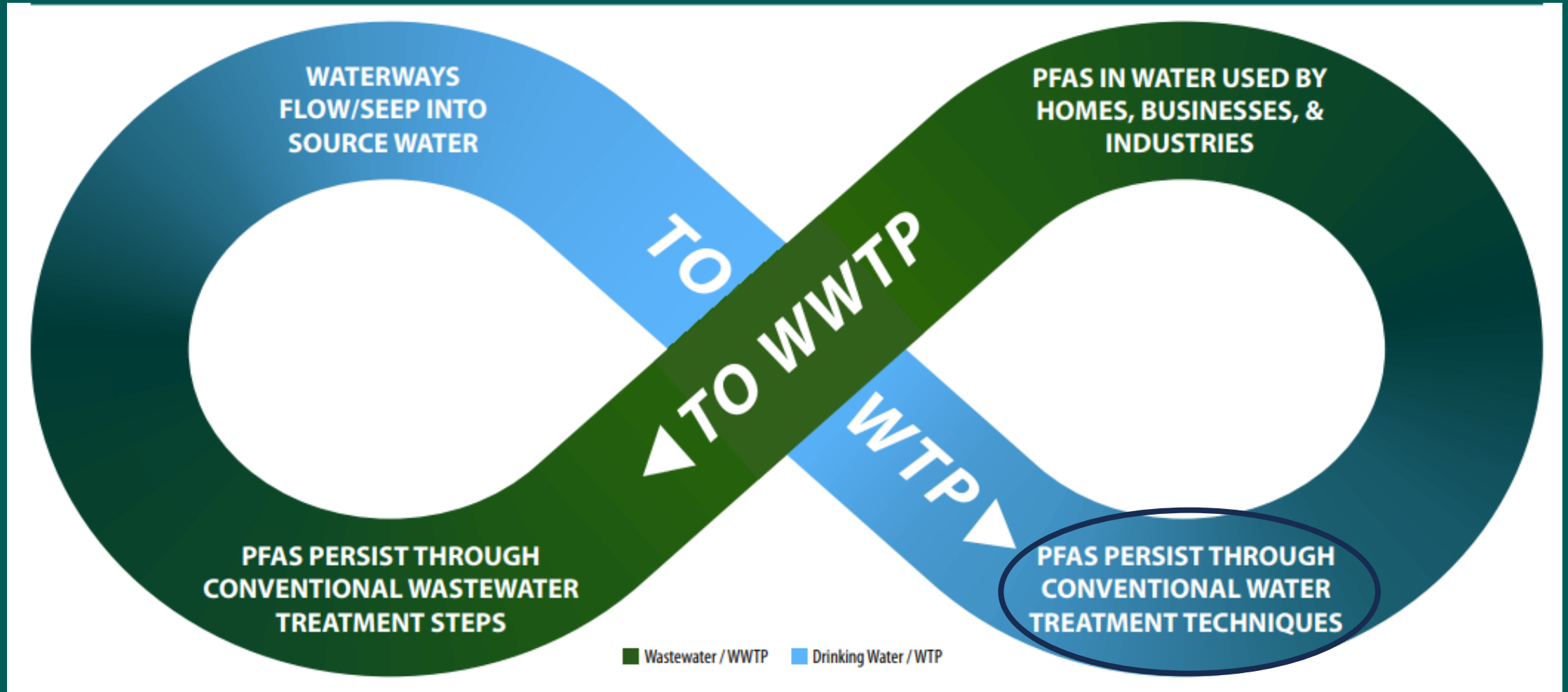
$$\text{Hazard Index} = \left(\frac{[\text{GenX}_{\text{water}}]}{[10 \text{ ppt}]} \right) + \left(\frac{[\text{PFBS}_{\text{water}}]}{[2000 \text{ ppt}]} \right) + \left(\frac{[\text{PFNA}_{\text{water}}]}{[10 \text{ ppt}]} \right) + \left(\frac{[\text{PFHxS}_{\text{water}}]}{[10 \text{ ppt}]} \right)$$

Fractions are scary, but PFAS are scarier

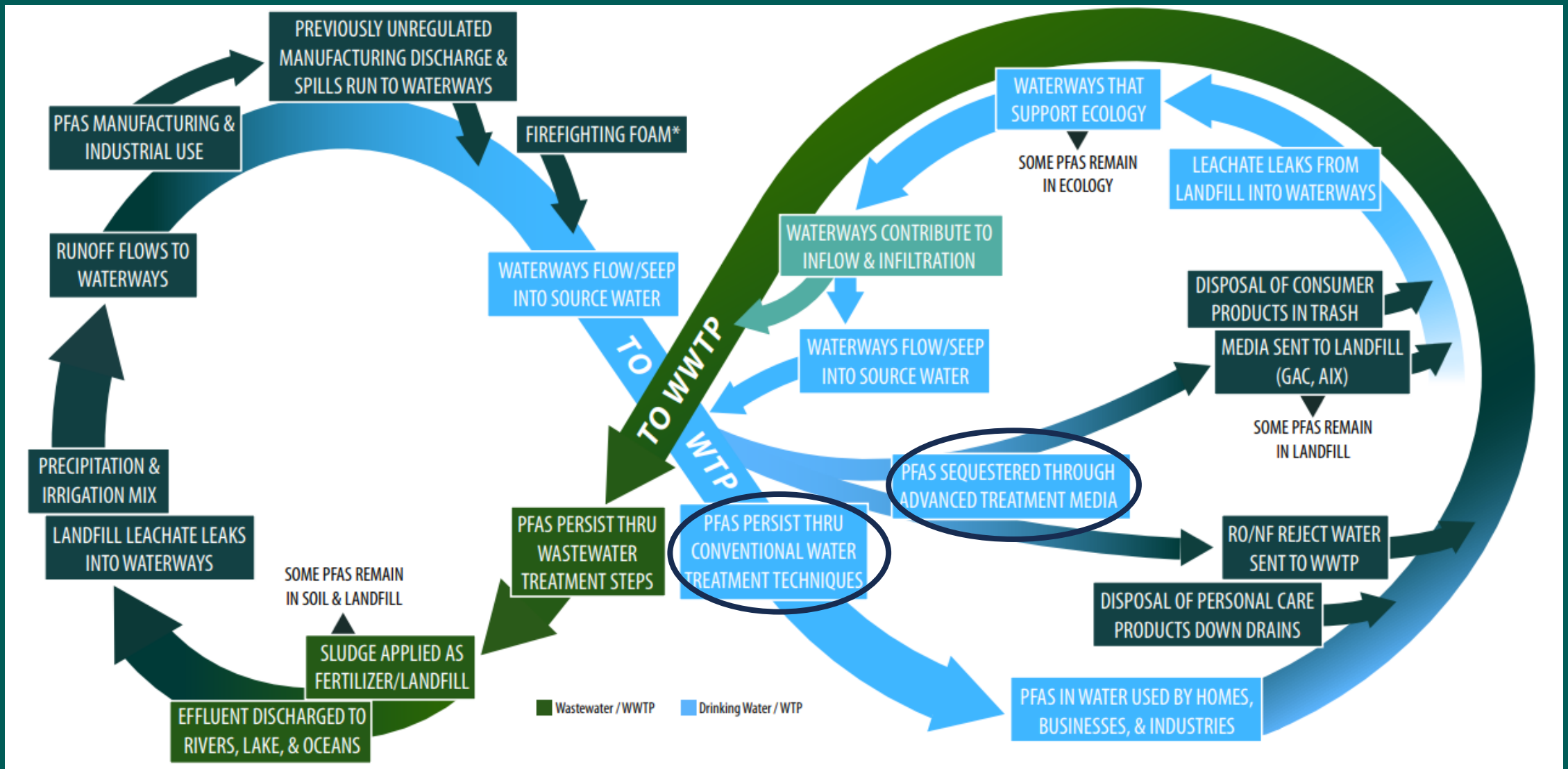


2. PFAS in the Environment

Sometimes chemistry does last forever...

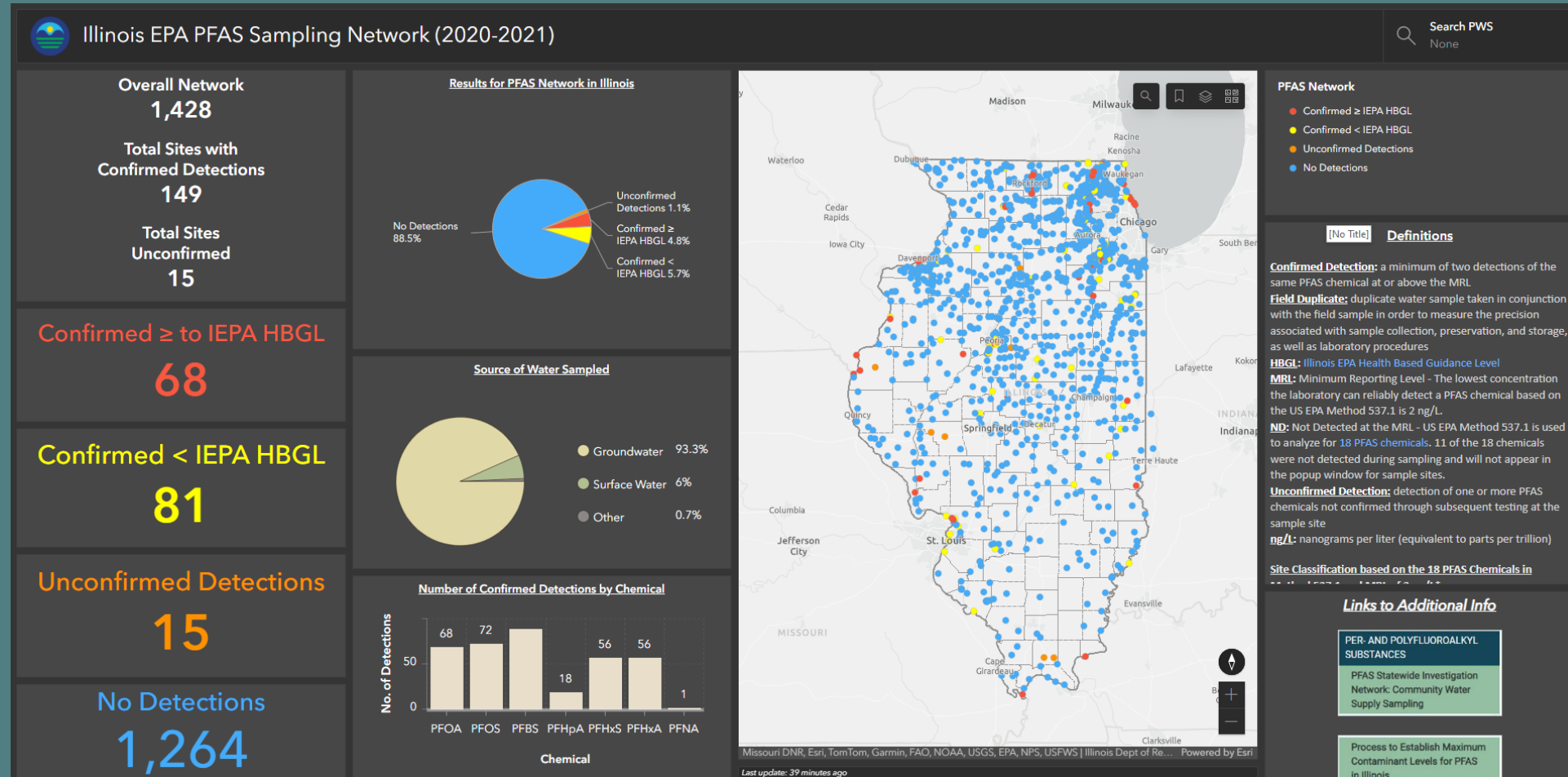


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3. PFAS in Illinois

IEPA Sampling Database



USGS Summary Report

- PFAS detected in 118 of the 1,017 Illinois CWS tested
 - More than 1.3 million served
- Most frequently detected: PFBS (6.2%), PFOS (5.0%), PFOA (4.8%)
- 99% of all results below the MRL of 2 ng/L
- PFAS detections:
 - Surface-water (~35%, 30 of 85)
 - Groundwater (~9%, 114 of 1,333)
 - Mixed (50%, 5 of 10)
- Greater range of concentrations observed in groundwater (2 to 150 ng/L) than in surface water (2 to 15 ng/L)

Gahala, Amy M., Jennifer B. Sharpe, and Andrew M. Williams. *Statewide sampling to determine spatial distribution, prevalence, and occurrence of per-and polyfluoroalkyl substances (PFAS) in Illinois community water supplies, 2020–21*. No. 2023-5078. US Geological Survey, 2023.



4. Sampling and Reporting

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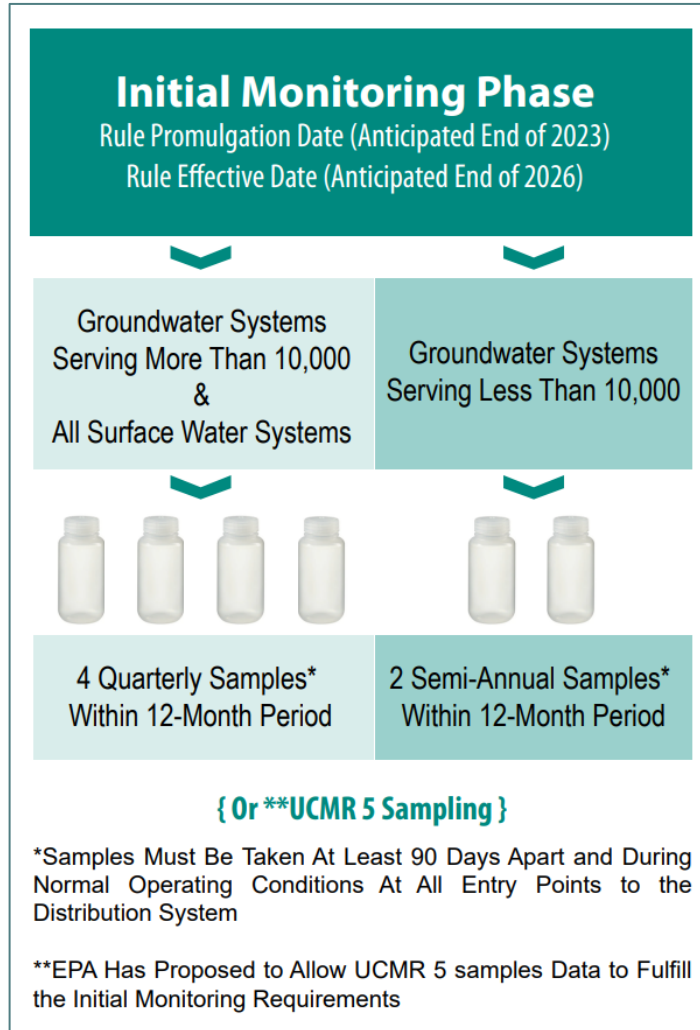
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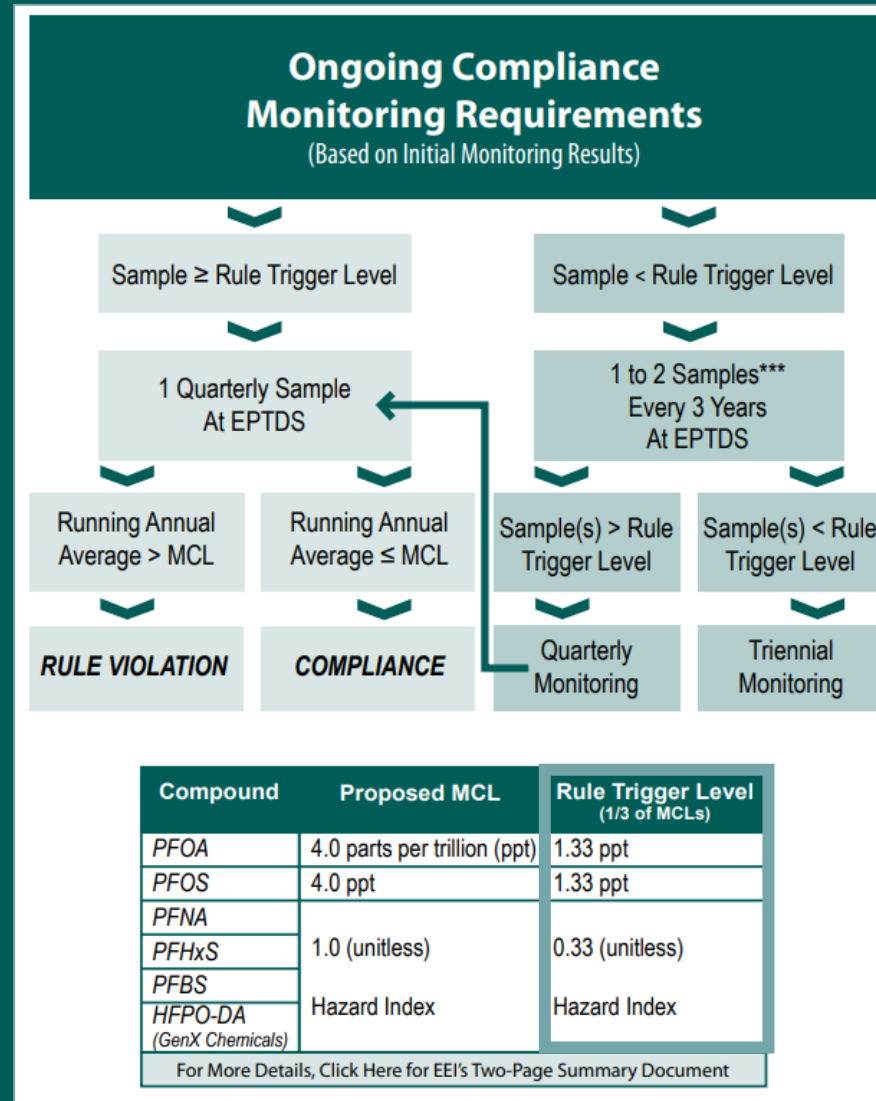
April 2029: MCL and HI compliance effective date



- Find a lab and prepare for sampling
- *Or* use UCMR5 sample results



- Keep an eye on concentrations vs. Rule Trigger Level



*** 1 sample every 3 years
for all system types at all
EPTDS (under final rule)

FINAL RULE UPDATE:
Rule Trigger Level is set to ½ of the MCLs for all regulated species.

Species	RTL
PFOA PFOS	2 ppt
PFHxS PFNA HFPO-DA	5 ppt
HI	0.5



Approved Lab Techniques

- What's the difference between Methods 533 and 537.1?

Analyte	Abbreviation	CASRN	Method 533	Method 537.1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9	x	x
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1	x	x
4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4	x	x
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6	x	x
Perfluorobutanesulfonic acid	PFBS	375-73-5	x	x
Perfluorodecanoic acid	PFDA	335-76-2	x	x
Perfluorododecanoic acid	PFDoA	307-55-1	x	x
Perfluoroheptanoic acid	PFHpA	375-85-9	x	x
Perfluorohexanoic acid	PFHxA	307-24-4	x	x
Perfluorohexanesulfonic acid	PFHxS	355-46-4	x	x
Perfluorononanoic acid	PFNA	375-95-1	x	x
Perfluorooctanoic acid	PFOA	335-67-1	x	x
Perfluorooctanesulfonic acid	PFOS	1763-23-1	x	x
Perfluoroundecanoic acid	PFUnA	2058-94-8	x	x

- Both test for all 6 proposed regulated PFAS
- Both taken from EPTDS
- Same sampling procedure
- Different preservatives in bottles
- Ask your lab about specific:
 - Schedules
 - Costs



Sampling Logistics

1. Locate a lab with 533 or 537.1 capabilities
2. Lab sends you sampling bottles
3. Take samples at all EPTDS
4. Ship samples to lab
5. Receive results in ~4 weeks
6. Report concentrations to IEPA as required
7. Repeat as required

Laboratories Approved by EPA to Support UCMR 5



EPA approved the following laboratories after they met the application requirements and Proficiency Testing (PT) criteria for the Laboratory Approval Program (LAP) supporting the fifth cycle of the Unregulated Contaminant Monitoring Rule (UCMR 5). These laboratories can analyze UCMR 5 samples using those methods marked with an "X" next to their names. Any laboratory that withdraws from the LAP or subsequently fails to meet the method and program quality assurance/quality control (QA/QC) requirements will be permanently removed from this list.

Laboratory Information	Per- and Polyfluoroalkyl Substances (PFAS)		Lithium	Commercial Services
	EPA 533	EPA 537.1 Rev 2.0	EPA 200.7	
Accurate Environmental, LLC 505 South Lowry Stillwater, OK 74074 (405) 372-5300 danny.chance@accuratelabs.com	X	X	X	X
Advanced Environmental Laboratories, Inc. 9610 Princess Palm Avenue Tampa, FL 33619 (813) 630-9616			X	X
Advanced Environmental Laboratories, Inc. 6681 Southpoint Parkway Jacksonville, FL 32216 (904) 363-9350	X	X	X	X
Alpha Analytical 320 Forbes Boulevard Mansfield, MA 02048 (508) 898-9220	X	X	X	X
ALS Environmental - Holland 3352 128th Avenue Holland, MI 49424 (616) 399-6070 UCMR@ALSGlobal.com	X	X	X	X
ALS Environmental - Kelso 1317 South 13th Avenue Kelso, WA 98626 (360) 577-7222	X	X	X	X
American Analytics, Inc. 9765 Elton Avenue Chatsworth, CA 91311 (818) 998-5547	X	X	X	X
American Water Central Laboratory 1115 South Illinois Street Belleville, IL 62220 (618) 235-3600 document@amwater.com	X	X	X	X

Office of Water (MS-140)
815-B-23-007

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<https://www.epa.gov/system/files/documents/2022-01/ucmr5-approved-lab-list.pdf>

Approved Lab Facilities



Reporting Logistics

- Sample reports of detected or non-detected concentrations must be sent to your state’s “Primacy Agency” – in our case, the IEPA
- Include on water quality report when new sample info is available

TABLE 1 TO § 141.904

If you are a . . .	You must report . . .
System monitoring for regulated PFAS under the requirements of § 141.902 on a quarterly basis.	1. All sample results, including the location, number of samples taken at each location, date, and result during the previous quarter. 2. The running annual average at each sampling point of all samples taken in the last four quarters. 3. Whether, based on § 141.902, the MCL was violated. 4. Whether, based on § 141.902, the trigger level was met or exceeded.
System monitoring for regulated PFAS under the requirements of § 141.902 less frequently than quarterly.	1. The location, date, and result of each sample taken during the last monitoring period. 2. The running annual average at each sampling point of all samples taken in the last twelve months. 3. Whether, based on § 141.902, the trigger level was met or exceeded.



Fun, but real & true, facts about sampling

According to the IEPA PFAS sampling SOP, on the day of sampling, do not wear/use/bring...

Certain Clothing Types:

- Tyvek suits
- Flame resistant clothing
- Water resistant, stain resistant or water repellant clothing
- Rain gear
- Clothing that had been washed with fabric softeners or dried with anti-static sheets

Personal Care Products:

- Moisturizers and creams
- Cosmetic products (i.e., nail polish)
- Dental floss
- Shaving cream
- Sunscreen
- Insect repellent
- Sanitizer (unless PFAS-free)

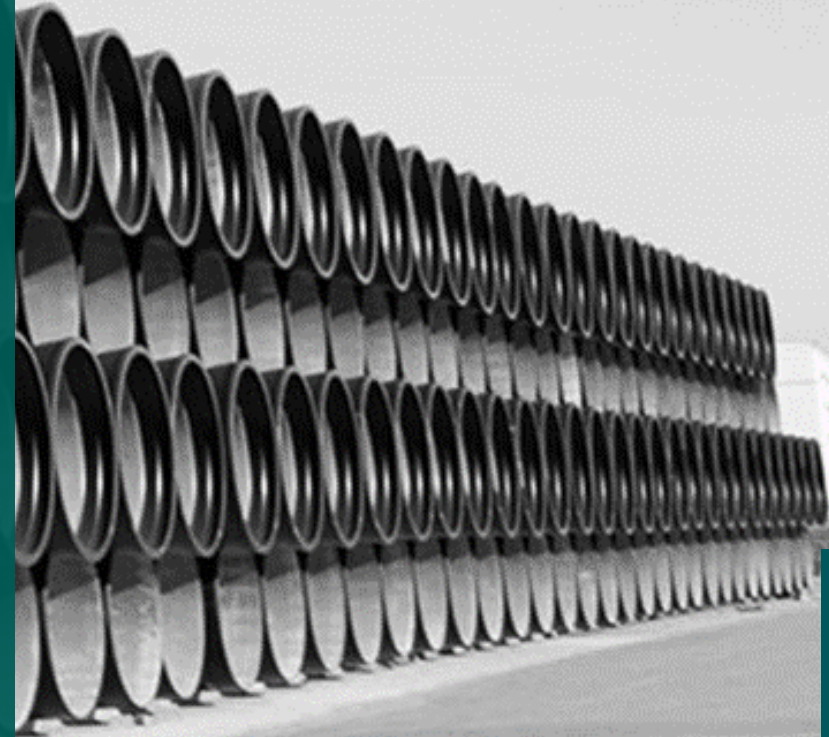
Miscellaneous Items:

- Packaged food and any food such as baked goods or sandwiches wrapped in grease-proof paper or bags
- Aluminum foil
- Adhesives (including Post-It notes and Scotch tape)
- Plumber sealant tape (thread tape) and plumbing paste
- Materials such as PTFE or Teflon®
- Permanent markers (use indelible ball point pens; no gel pens)
- Plastic clipboards
- Glass bottles

**Ask your lab about
their sampling SOP!**
Consider creating your
own SOP



5. Treatment and Operations



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Remediation Solutions

1. Media Adsorption



Granular Activated Carbon
(GAC)

USEPA's "BATs"
Best Available Technologies



Anion Exchange Resin
(AIX)

2. High-Pressure Filtration



Nanofiltration (NF) and
Reverse Osmosis (RO)

3. Switch Sources



Treatment Method Decision Table

	Granular Activated Carbon	Ion Exchange	High Pressure Membrane System
Removal	89 to 99%	90 to 99%	93 to 99%
	Competitive adsorption with other compounds	Competitive adsorption with other anionic compounds	Most efficient in removing PFAS
	Effective for removal of longer chain PFAS	Effective for a wider range of PFAS	High removal rate of PFAS
Wastewater/ Solid Disposal	Spent media to landfill or regeneration facility	Spent media to landfill or incineration facility	High PFAS concentration in reject water
Operator Certification	Class B	Class B	Class A
Footprint	Larger	Smaller	Smaller
Capital Cost*	\$	\$	\$\$
O&M Cost*	\$	\$	\$\$

*Costs are variable and must be evaluated per individual application



Treatment Feasibility Study

1. Evaluate sampling results
2. Define removal objectives
3. Treatment alternatives analysis
4. Pilot testing



Some Important Notes



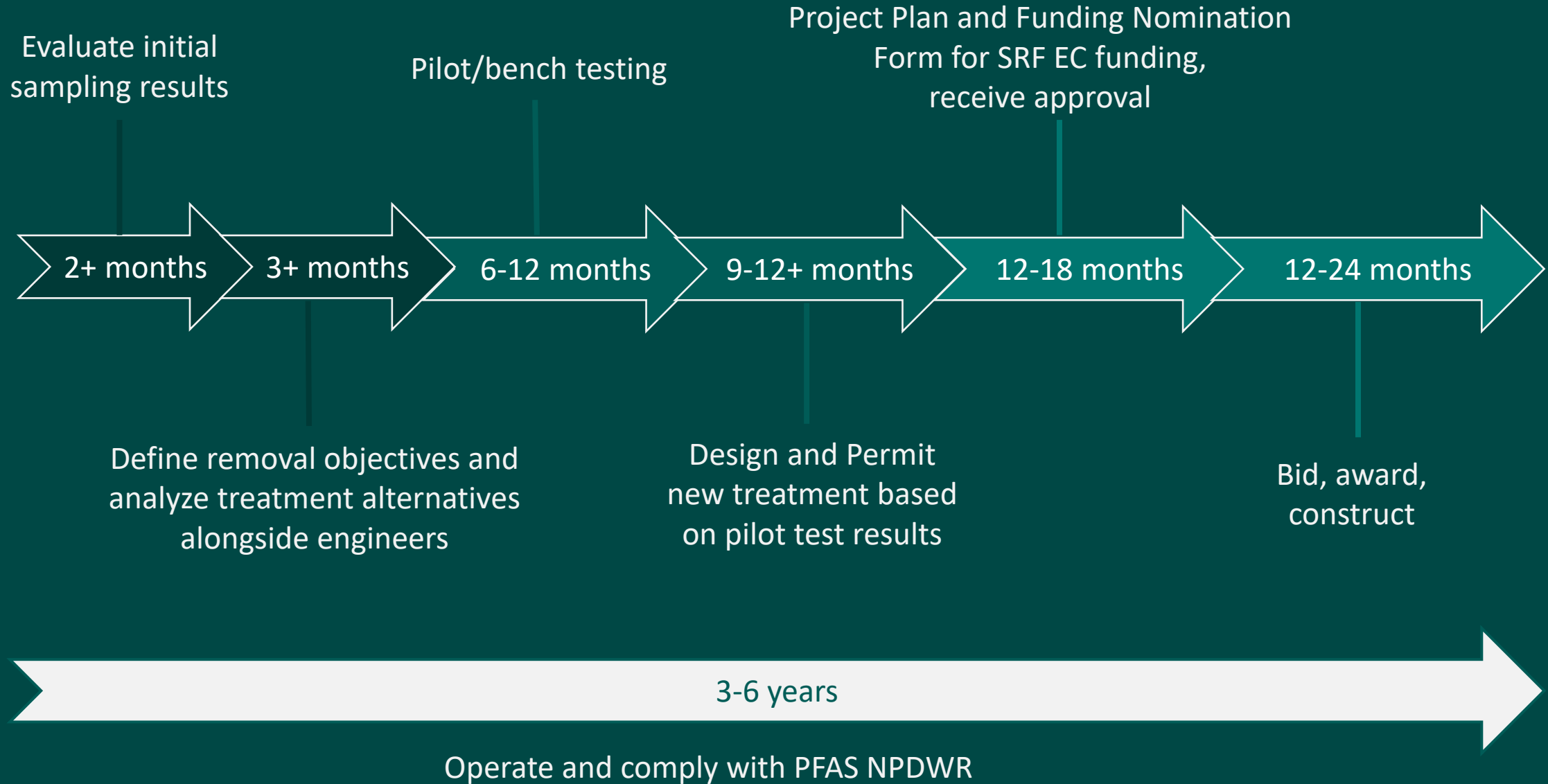
- The final rule does not allow the IEPA to issue **extension waivers** beyond the mid-2029 compliance date



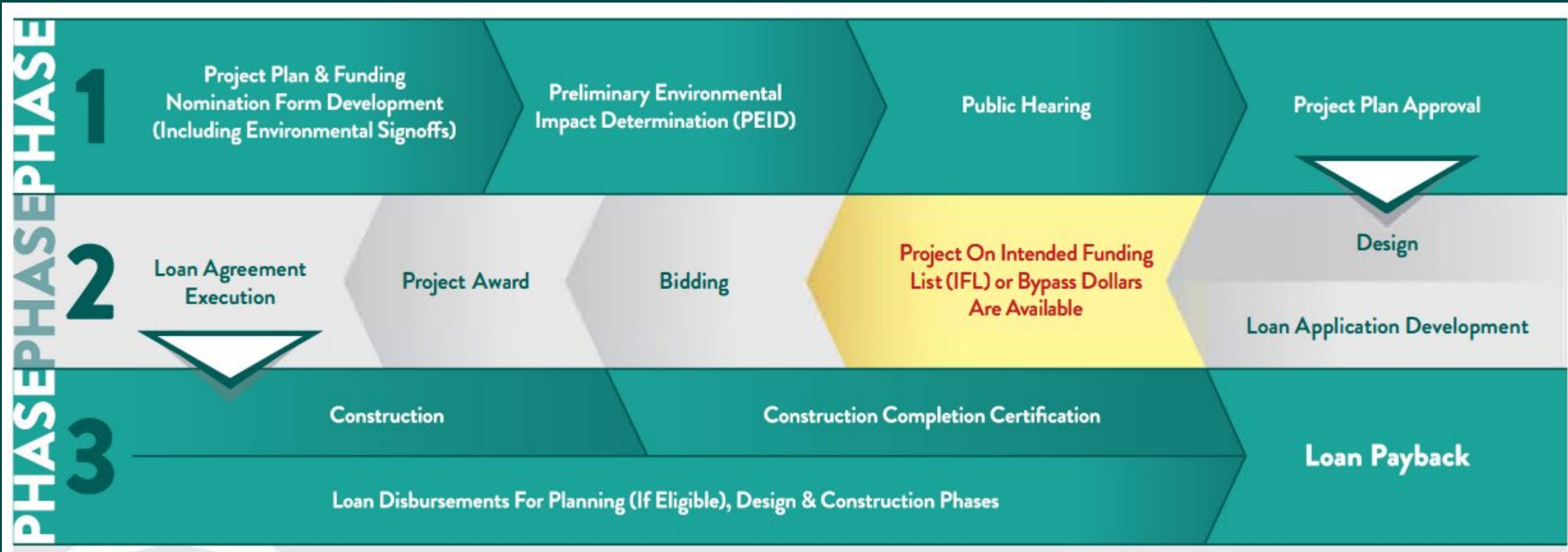
- PFAS treatment infrastructure projects will receive priority for **SRF Emerging Contaminant Loan** funding in Illinois
- SRF Emerging Contaminant Loans may be used for PFAS capital projects, but not for costs related to sampling and monitoring requirements
- SRF Emerging Contaminant Loans include principal forgiveness



Timeline Considerations – Treatment Implementation



Timeline Considerations – SRF Funding



6. Looking Forward

The Conundrums

- *We remove PFAS from our drinking water, but then where does the highly concentrated media/brine go?*
- Landfill leachate is a large culprit of PFAS pollution perpetuation
 - Detections in the parts per billion range
 - (Proposed NPDWR is in parts per trillion range)

What's next?

- **Destruction technologies**
 - Incineration
 - Foam fractionation
 - Supercritical water oxidation (SCWO)
 - Electrochemical treatment
 - Photolysis
 - Others!
- **Currently in pilot phases** for large applications (i.e., municipal WTP waste material)



In Summary:

- Stay tuned for the USEPA's NPDWR promulgation and the evolution of other PFAS regulations
- 1st Step: Initial monitoring/UCMR5
- If Treatment Required:
 - Start implementation process ASAP
 - Recommend treatment feasibility study and pilot testing
 - Submit Project Plan for SRF EC funding
 - Bid, award, construct according to SRF guidelines (if on IFL or bypass)
- Technologies and regulations regarding disposal of waste products from treatment processes may impact PFAS mitigation in drinking water





**Questions or
Comments?**

THANK YOU

We value your time and appreciate the opportunity to prepare you for PFAS.



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