PFAS

Vijai Elango

PFAS

?

Everywhere

Dangerous-
Human Health

Forever

DUPONT

GM

General Motors

Early 1930s – Freon Refrigerant

1938

Dr. Roy J Plunkett - PTFE (TEFLON)

PTFE (Teflon) – 1942 to 1946

LOUISIANA DEPARTMENT OF HEALTH

1950


SCOTCHGARD
STAIN REPELLER
presents
THE SPOTLESS LOOK
Spills won't soak in, won't stain . . . just blot away!
Never before! Furniture with locked-in-the-fabric protection against soil and stains . . . even from a teen-ager's antics!
LOOK FOR THE "SCOTCHGARD" BRAND NAME BEFORE YOU BUY. Make sure your furniture will have The Spotless Look! Forget about those topsy-turvy teen-age antics! With "SCOTCHGARD" Stain Repeller, every fiber of the fabric is protected with a shield that you
surface dust and dirt away! And even spills—not only from cola, coffee or party drinks, but oily ones like salad dressing, gravy, potato chip dip—can be blotted up without staining. Only "SCOTCHGARD" Brand Stain
Repeller brings you such complete protection against soil and stains. Nothing else repels oily stains! We urge you: Look for the castle symbol on streamers when you buy furniture. Ask for the extra protection of "SCOTCHGARD" Repeller. It's on your fashions, too—and his.
MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW
3M

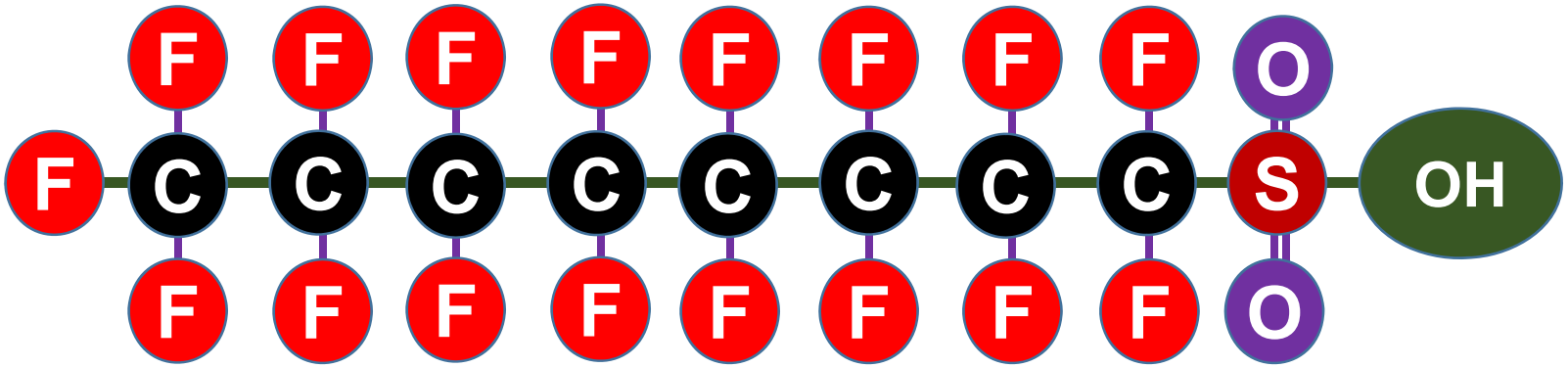
2025


Scotchgard
3M
AUTO FABRIC & CARPE
WATER SHIELD
• Waterproofs Fabric
• Protects Against Salt Damage
Scotchgard
3M
FABRIC
WATER SHIELD
• Long Lasting Protection
• Waterproofs Fabric
Scotchgard
3M
RUG & CARPET
PROTECTOR
• Blocks Stains
• Keeps Rugs & Carpets Looking

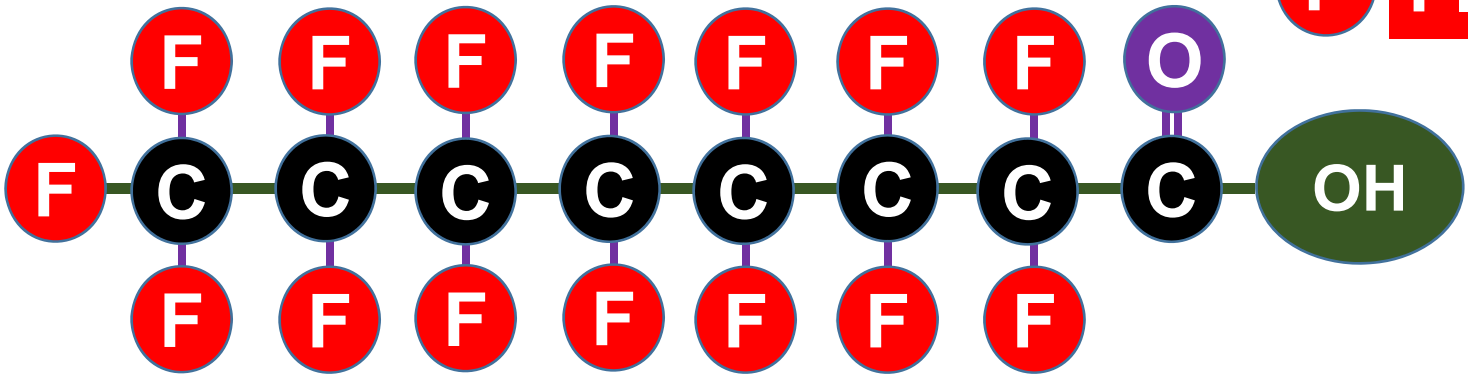
1940s-1950s

LOUISIANA DEPARTMENT OF HEALTH

Perfluorooctane sulfonic acid - PFOS



Perfluorooctanoic acid - PFOA



C Carbon

F Fluorine

O Oxygen

H Hydrogen

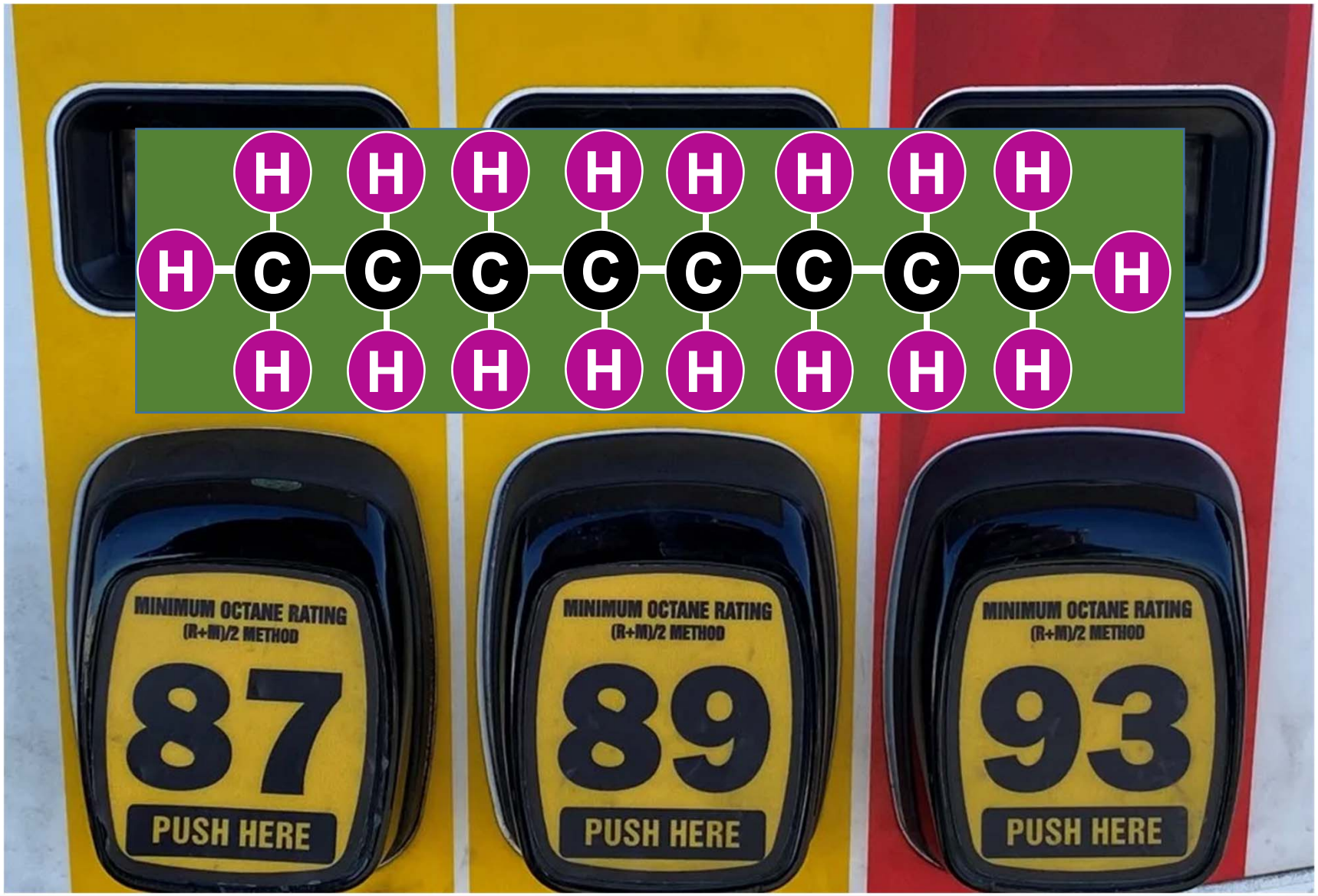
S Sulphur

Gasoline

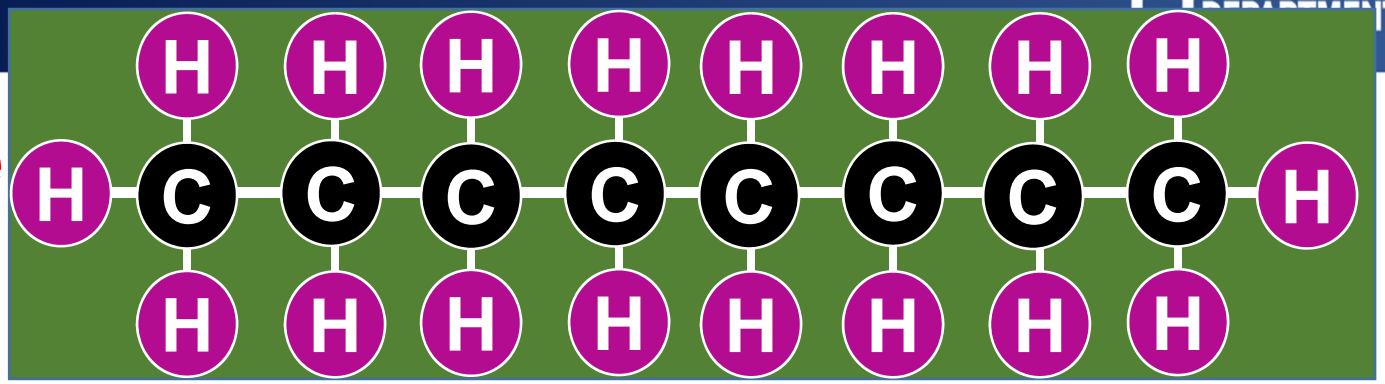
LOUISIANA DEPARTMENT OF HEALTH

Octane Rating

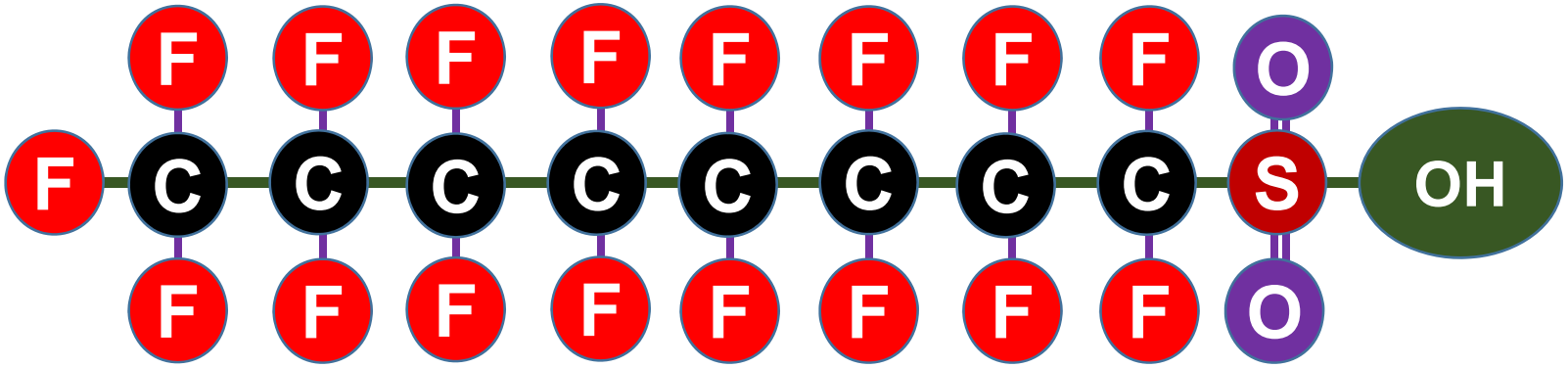
LOUISIANA DEPARTMENT OF HEALTH



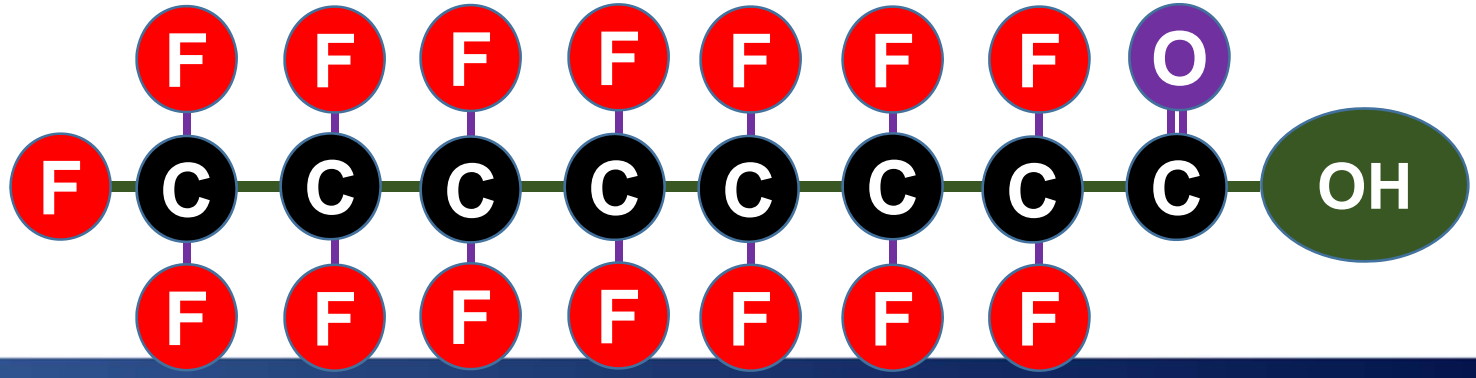
Octane
114
g/mol



PFOS
500
g/mol



PFOA
414
g/mol



Innovation (incremental)

LOUISIANA DEPARTMENT OF HEALTH

11Cl-PF3OUDS	HFPO-DA (GenX)	PFBA	PFHxA	PFPUnA
8:2 FTS	NFDHA	PFDA	PFNA	NEtFOSAA
4:2 FTS	PFEESA	PFDoA	PFOS	NMeFOSAA
6:2 FTS	PFMPA	PFHpS	PFOA	PFTA
ADONA	PFMBA	PFHpA	PFPeS	PFTrDA
9Cl-PF3ONS	PFBS	PFHxS	PFPeA	10,000

Innovation (incremental)

LOUISIANA DEPARTMENT OF HEALTH

11Cl-PF3OUDS	HFPO-DA (GenX)	PFBA	PFHxA	PFPUnA
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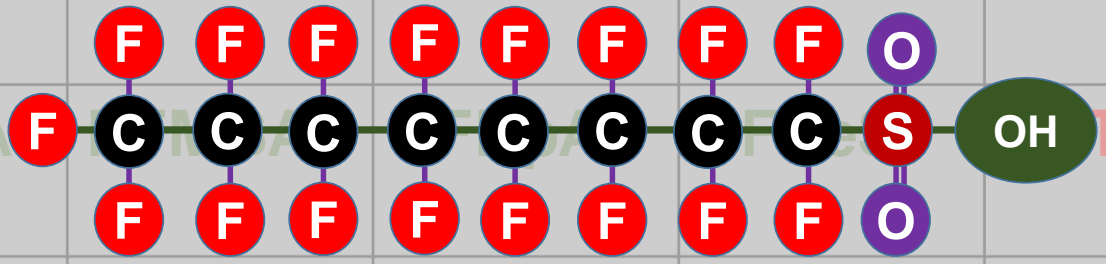
ADONA	PFMBA	PFNA	PFPeA	PFTrDA
9Cl-PF3ONS	PFBS	PFHxS	PFPeA	10,000

PFAS

Per and Polyfluoroalkyl Substances



1961


AMAZING NEW
CONCEPT IN
Cooking
FREE
SPATULA
WITH EACH
"HAPPY PAN"
NOTHING STICKS TO
"HAPPY PAN"
A cast iron skillet sealed with DuPont TEFLON®

1960-1970

LOUISIANA DEPARTMENT OF HEALTH

1961-2024

LOUISIANA DEPARTMENT OF HEALTH

FIRE RETARDANT FOAMS

ELECTRONICS

NONSTICK COOKWARE

RAINCOATS

MICROWAVE POPCORN BAGS

PFAS- Forever Chemical

LOUISIANA DEPARTMENT OF HEALTH

PFAS	Half Life in Humans
PFOA	2.1 to 10.1 years
PFOS	3.3 to 37 years
PFBS	665 hours

Time to remove 100 ppt PFOS from human blood

1. 100 ppt to 50 ppt = 3.3 years
2. 50 ppt to 25 ppt = 3.3 years
3. 25 ppt to 12.5 ppt = 3.3 years
4. 12.5 to 6.25 ppt = 3.3 years
5. 6.25 ppt to 3.125 ppt = 3.3 years

Approximately 17 years

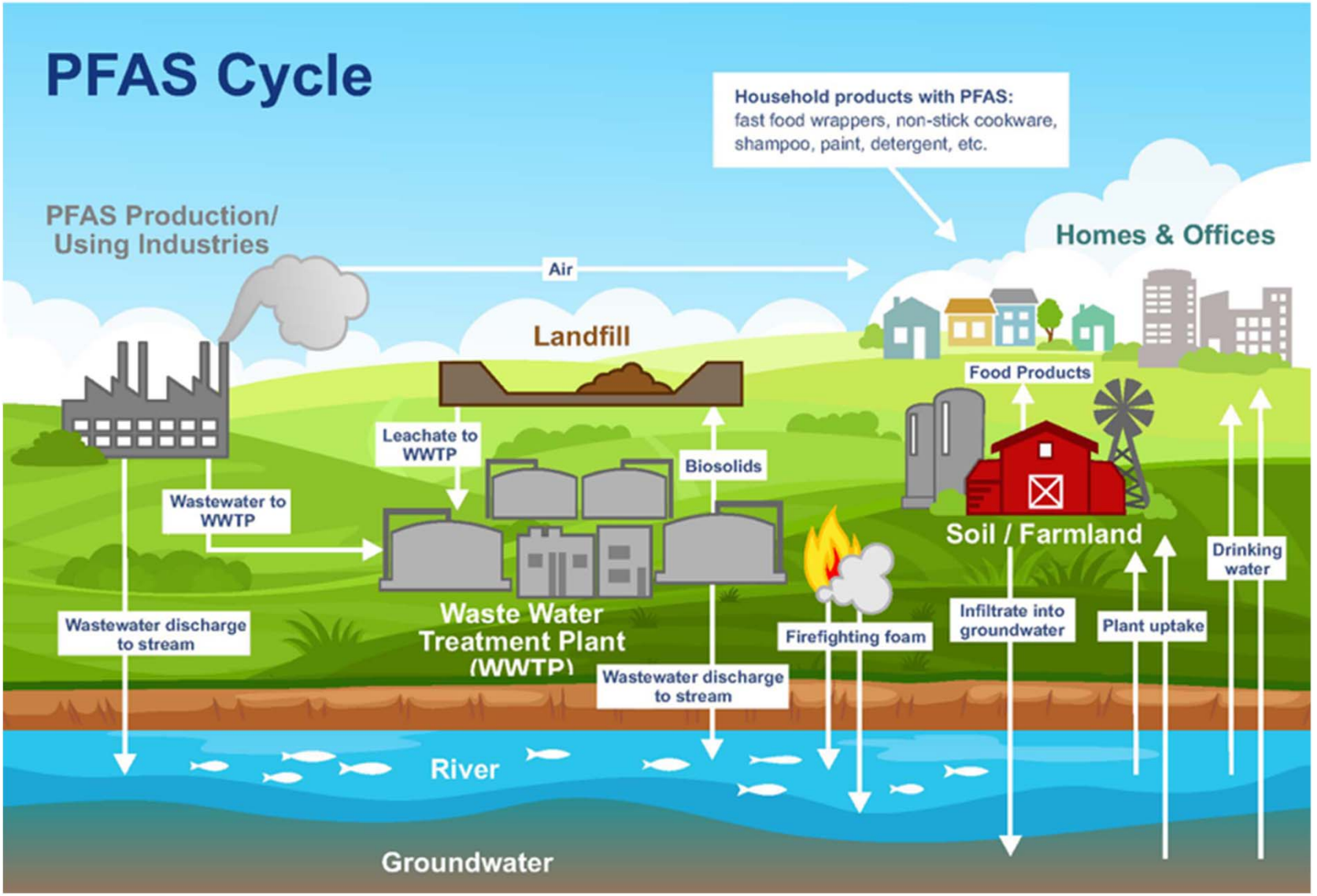
PFAS Human Health

LOUISIANA DEPARTMENT OF HEALTH

- Liver Cell Death
- Birth defects in children born to occupationally exposed woman
- Increased cancer (kidney, prostate, liver), leukemia, kidney disease and elevated cholesterol
- Developmental delays in children
- PFAS transmitted via placenta and breast milk

PFAS Fate & Transport

LOUISIANA DEPARTMENT OF HEALTH



PFAS – Final Rule

LOUISIANA DEPARTMENT OF HEALTH

- Published: April 26, 2024
- Effective Date: June 25,2024
- 40 CFR Part 141 Subpart Z §141.900 – 141.905
- https://www.govinfo.gov/content/pkg/FR-2024-04-26/pdf/2024-07773.pdf

PFAS – Final Rule

LOUISIANA DEPARTMENT OF HEALTH

PFOA	Perfluoroctane Sulfonic Acid
PFOS	Perfluoroctanoic Acid
PFHxS	Perfluorohexane Sulfonic Acid
PFNA	Perfluorononoic Acid
HFPO-DA (GenX)	Hexafluoropropylene Oxide Dimer Acid (GenX)
PFBS	Perfluorobutanesulfonic Acid

PFAS Final Rule

LOUISIANA DEPARTMENT OF HEALTH

PFAS	MCLG (ppt)	MCL (ppt)	Trigger Levels (ppt)
PFOA	0	4.0	2.0
PFOS	0	4.0	2.0
PFHxS	10	10	5
PFNA	10	10	5
HFPO-DA (GenX)	10	10	5

Hazard Index (HI)

$$\left(\frac{[GenX_{water}]}{[10\ ppt]}\right) + \left(\frac{[PFBS_{water}]}{[2000\ ppt]}\right) + \left(\frac{[PFNA_{water}]}{[10\ ppt]}\right) + \left(\frac{[PFHxS_{water}]}{[10.0\ ppt]}\right) = 1$$

PFAS Final Rule

LOUISIANA DEPARTMENT OF HEALTH

PFAS	MCLG (ppt)	MCL (ppt)	Trigger Levels (ppt)
PFOA	0	4.0	2.0
PFOS	0	4.0	2.0
PFHxS	10	10	5
PFNA	10	10	5
HFPO-DA (GenX)	10	10	5

Arsenic = 10 ppb = 10 µg/L = 10,000 ppt
Lead = 10 ppb = 10 µg/L = 10,000 ppt
TTHM = 80 ppb = 80 µg/L = 80,000 ppt

Applicable

LOUISIANA DEPARTMENT OF HEALTH

- Community Water Systems (CWS)
- Non-Transient Non Community Water Systems (NTNCWS)

Initial Monitoring 2024-2027

LOUISIANA DEPARTMENT OF HEALTH

Water Source	Number of Samples	Frequency
Groundwater CWS & NTNCWS under 10,000	Two	Consecutive 12 months, 5 to 7 months apart
Groundwater CWS & NTNCWS above 10,000	Four Quarterly	Consecutive 12 months, 2 to 4 months apart
Surface water CWS & NTNCWS		

Initial Monitoring

LOUISIANA DEPARTMENT OF HEALTH

- Previously Collected Data (from Jan 2019)
  - UCMR 5
  - State Collected Samples
- If needed
  - Additional quarterly samples
  - outside 12 months
  - Need all 4 quarters

Initial Monitoring

LOUISIANA DEPARTMENT OF HEALTH

- Start: April 2024
- At the Entry Point
- LDH (Matrix) will Collect Samples
- LDH Pays Collection & Analysis Cost
- Deadline: April 26, 2027

Reduced Monitoring

LOUISIANA DEPARTMENT OF HEALTH

- Initial Monitoring below Trigger Levels in all samples
- Triennial - 3 year cycle
- Return to Quarterly: above trigger level

PFAS	MCL (ppt)	Trigger Levels (ppt)
PFOA	4.0	2.0
PFOS	4.0	2.0
PFHxS	10	5

PFAS	MCL (ppt)	Trigger Levels (ppt)
PFNA	10	5
HFPO-DA (GenX)	10	5
Hazard Index	1	0.5

Note: Contact UCMR 5 Lab results & Practical Quantitation Levels (PQL) below trigger level

Practical Quantitation Levels (PQL)

Parameters	Results	Units	PQL	MDL
537.1 PFAS Compounds, Water	Analytical Method: EPA 537.1 Preparation Metho			
	Pace Analytical Services - Ormond Beach			
11Cl-PF3OUdS	**<0.0015**	ug/L	0.0019	0.0015
9Cl-PF3ONS	**<0.0011**	ug/L	0.0019	0.0011
ADONA	**<0.00069**	ug/L	0.0019	0.00069
HFPO-DA	**<0.0015**	ug/L	0.0019	0.0015
NEtFOSAA	**<0.00088**	ug/L	0.0019	0.00088
NMeFOSAA	**<0.0015**	ug/L	0.0019	0.0015
PFBS	**<0.00063**	ug/L	0.0019	0.00063
PFDA	**<0.00092**	ug/L	0.0019	0.00092
PFHxA	**<0.0012**	ug/L	0.0019	0.0012
PFDoA	**<0.0014**	ug/L	0.0019	0.0014
PFHpA	**<0.00095**	ug/L	0.0019	0.00095
PFHxS	**<0.00069**	ug/L	0.0019	0.00069
PFNA	**<0.0019**	ug/L	0.0019	0.0019
PFOS	**<0.0011**	ug/L	0.0019	0.0011
PFOA	**<0.00083**	ug/L	0.0019	0.00083
PFTeDA	**<0.0018**	ug/L	0.0019	0.0018
PFTrDA	**<0.0016**	ug/L	0.0019	0.0016
PFUnA	**<0.0019**	ug/L	0.0019	0.0019

2027 Compliance Monitoring

LOUISIANA DEPARTMENT OF HEALTH

Water Source	Number of Samples	Frequency
Groundwater CWS & NTNCWS under 10,000	Four Quarterly	Consecutive 12 months, 2 to 4 months apart
Groundwater CWS & NTNCWS above 10,000		
Surface water CWS & NTNCWS		

Reduced Monitoring-Annual

LOUISIANA DEPARTMENT OF HEALTH

- Below MCL all 4 quarters
- Return to Quarterly: MCL or MCL exceedance

PFAS	MCL (ppt)
PFOA	4.0
PFOS	4.0
PFHxS	10
PFNA	10

PFAS	MCL (ppt)
HFPO-DA (GenX)	10
Hazard Index	1

Reduced Monitoring-3 years

LOUISIANA DEPARTMENT OF HEALTH

- Three Consecutive Annual Samples below Trigger Levels
- Return to Quarterly: above Trigger Level

PFAS	MCL (ppt)	Trigger Levels (ppt)
PFOA	4.0	2.0
PFOS	4.0	2.0
PFHxS	10	5

PFAS	MCL (ppt)	Trigger Levels (ppt)
PFNA	10	5
HFPO-DA (GenX)	10	5
Hazard Index	1	0.5

Compliance Determination Example 1

PFAS	Concentration (ppt)			
	QTR 1	QTR2	QTR 3	QTR 4
PFOA	4	3	5	3

(4+3+5+3)/4 = 3.7

0.5 or higher, round to higher number,

Running Annual Average (RAA) = 4 (No MCL Exceedance)

QTR = Quarter

Hazard Index (HI) Calculation

PFAS	Concentration (ppt)				
	QTR 1	QTR2	QTR 3	QTR 4	RAA
PFHxS	4/10	3/10	5/10	3/10	
PFNA	4/10	5/10	5/10	4/10	
HFPO-DA (GenX)	5/10	6/10	4/10	7/10	
PFBS	10/2000	15/2000	5/2000	12/2000	
HI	1.30	1.41	1.40	1.41	1

$$\left(\frac{[GenX_{water}]}{[10\ ppt]}\right) + \left(\frac{[PFBS_{water}]}{[2000\ ppt]}\right) + \left(\frac{[PFNA_{water}]}{[10\ ppt]}\right) + \left(\frac{[PFHxS_{water}]}{[10.0\ ppt]}\right) = 1$$

Hazard Index = 1.38, round to 1, no violation

Compliance Determination Example 1

- No MCL Violation
- No HI Violation
- Publish Results in CCR
- 3rd Quarter PFOA MCL Exceedance– Quarterly Monitoring

Violations

LOUISIANA DEPARTMENT OF HEALTH

MCL Violation: Tier 2 public notice, no later than 30 days

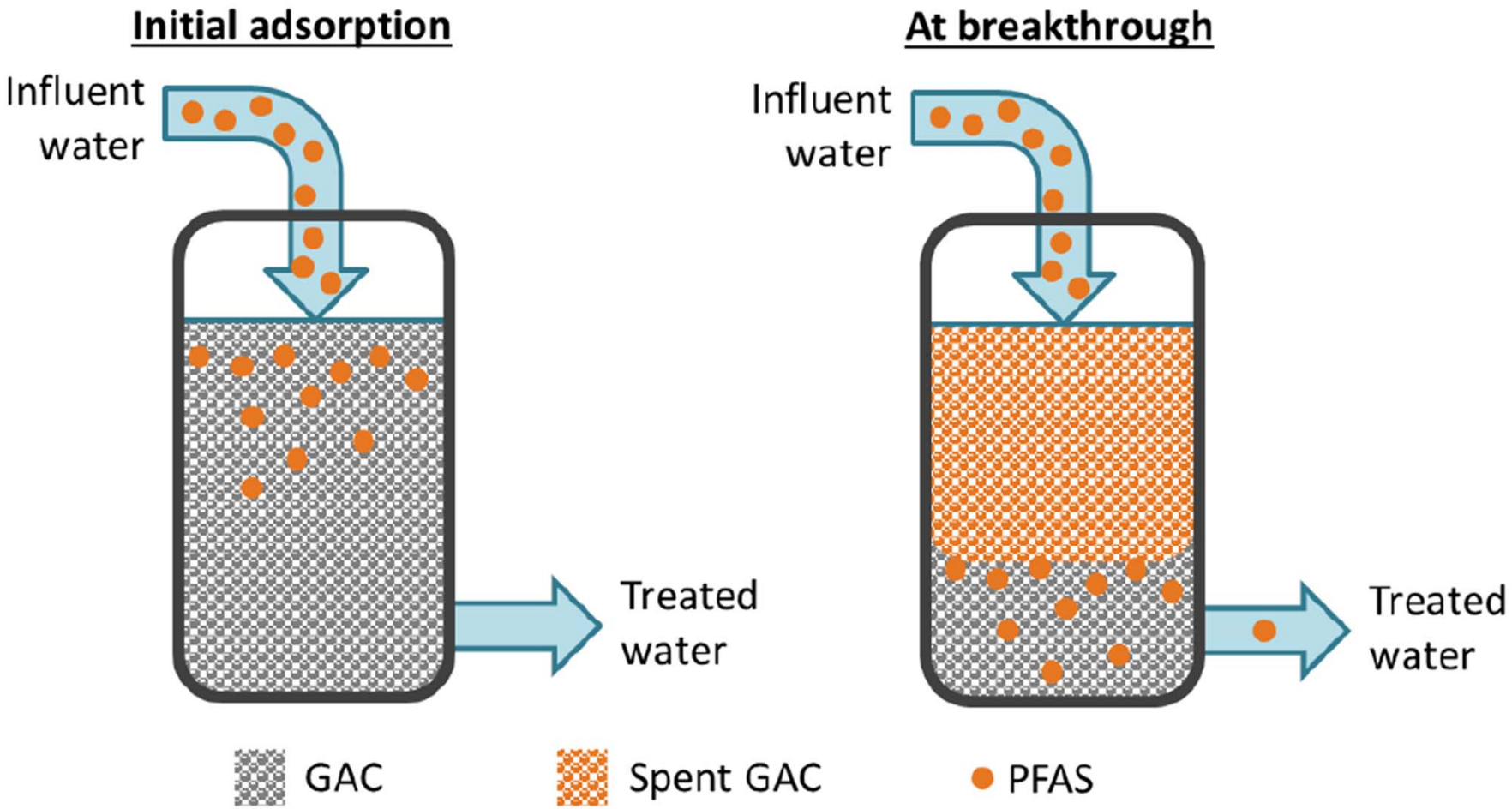
Publish Results CCR

Quarterly Monitoring

Best Available Technologies (BAT)

- Granular Activated Carbon (GAC)
- Anion Exchange Resins (AIX)
- Nano Filtration (NF)
- Reverse Osmosis (RO)
- Other technologies of interest to water system
- Point of Use (POU) not available for compliance

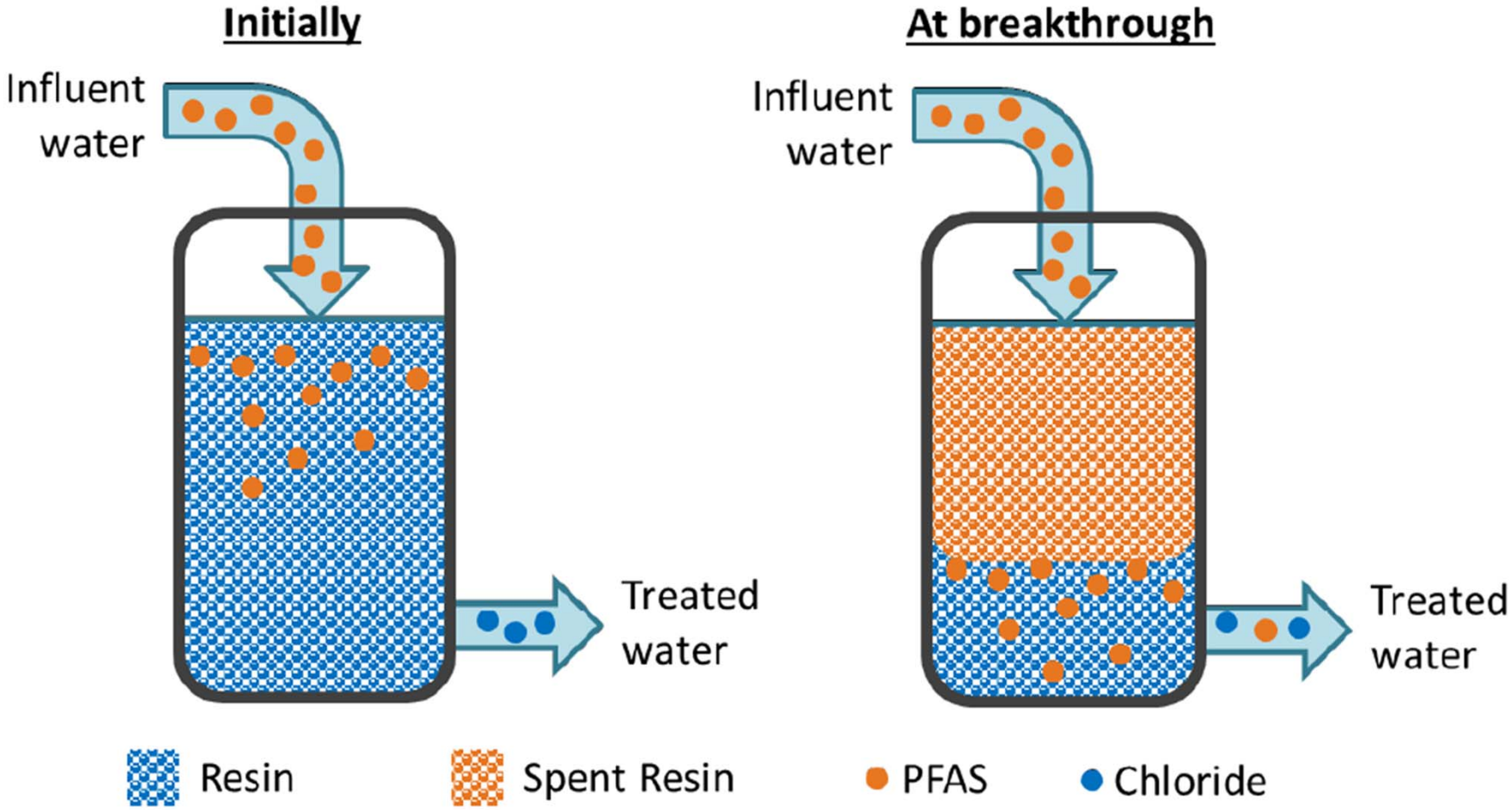
Granular Activated Carbon (GAC)



Granular Activated Carbon (GAC)

- Greater than 99% removal efficiency
- Co-contaminants (Organics, DBPs) removal
- Arsenic Contamination- Possible
  - Discard initial bed volumes
  - Acid washed & pre rinsed GAC
- Residual Disposal/Spent GAC
  - Regeneration or Landfill

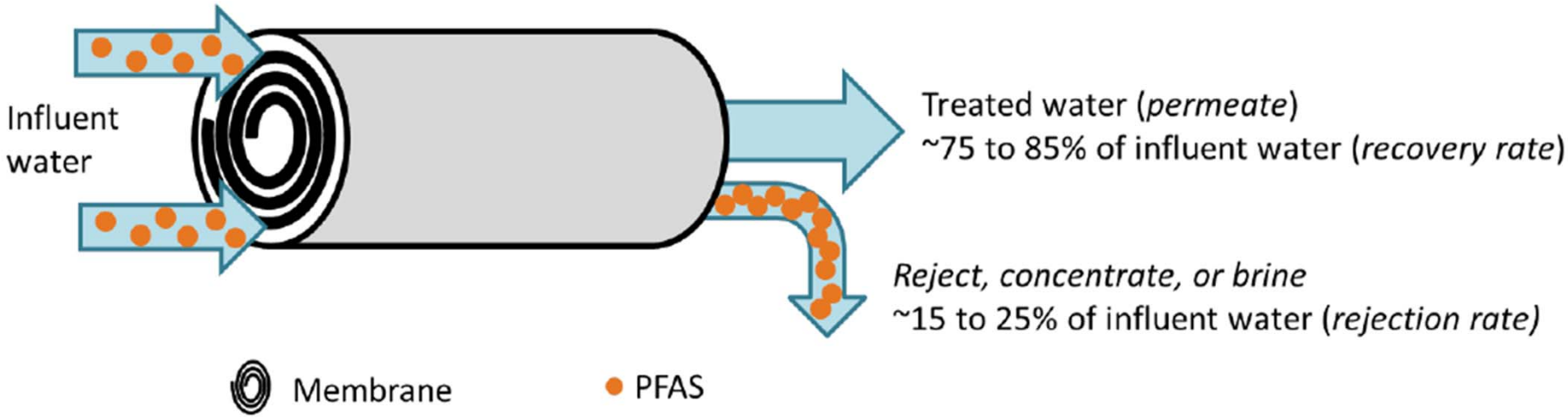
Anion Exchange Resin (AIX)



Anion Exchange Resin (AIX)

- Greater than 99% removal efficiency
- Co-contaminants (sulfate, nitrate, bicarbonate) removal
- Need post treatment corrosion inhibitor
- Residual / Spent Resin
  - Single Use Resin
  - Regeneration with organic solvents

Reverse Osmosis (RO)/ Nano Filtration (NF)



Reverse Osmosis (RO)/ Nano Filtration (NF)

- Greater than 99% removal efficiency
- Co-contaminants (dissolved inorganics, TDS, nitrate, radionuclides, etc.) removal
- Post treatment corrosion control
- Residual / Reject, concentrate
  - Large volume and high PFAS
  - Requires additional treatment

UCMR 5: 2022-2026

Participating Water Systems

	Population less than 10,000	Population greater than 10,000	Total
Nationwide	5,947	4,364	10,311
Louisiana	192	76	268

Louisiana- UCMR5 - PFAS

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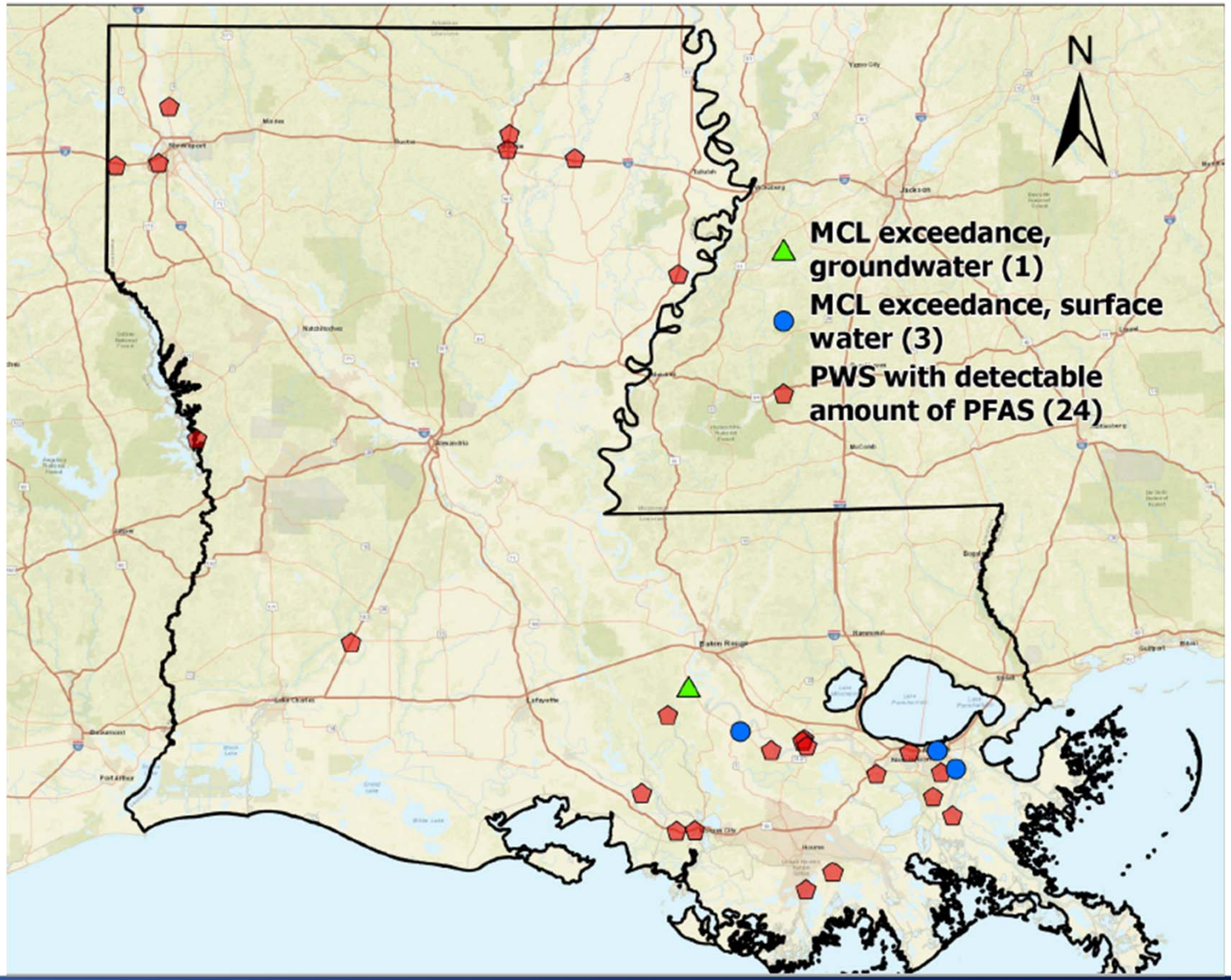

Summary

LOUISIANA DEPARTMENT OF HEALTH

PFOA and PFOS MCL and Hazard Index implementation 2024-2027

UCMR 5 & Initial Monitoring data determine PFAS prevalence in drinking water