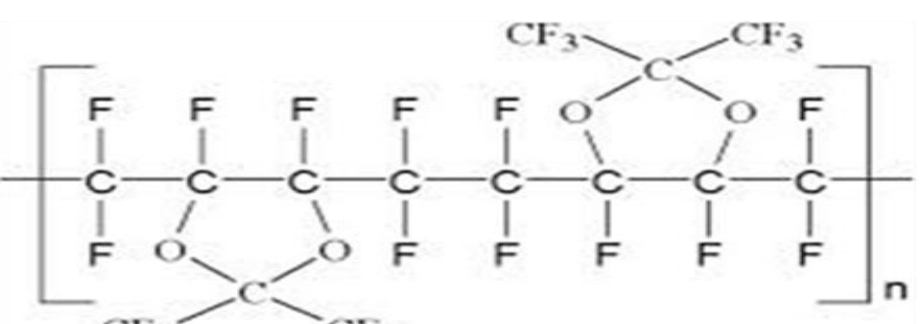
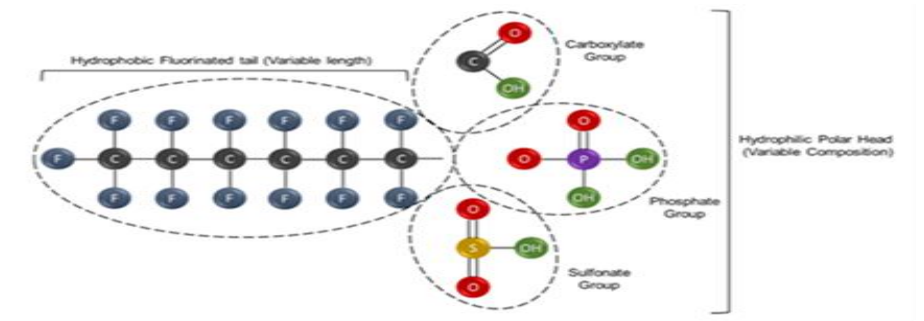


Background



- ❖ PFAS are useful but problematic chemicals
- ❖ Resistant to heat, chemicals, and environmental degradation.



Primary sources of PFAS in WTW

Study Aim: To quantify the occurrence, distribution, and mass balance of PFAS across drinking water treatment works and identify key sources, sinks, and exposure pathways.

PFAS TYPE	DOMINANT BEHAVIOUR	BEST TREATMENT
Long-chain PFAS	Sorption-dominated	GAC, PAC, IX
Short-chain PFAS	Mobility-dominated	IX, RO/NF
Surface-active PFAS	Foam accumulation	Foam Fractionation
Persistent PFAS	Resistant to degradation	EO, Plasma, SCWO
Precursors	Transformation to PFAAs	Destructive Technologies

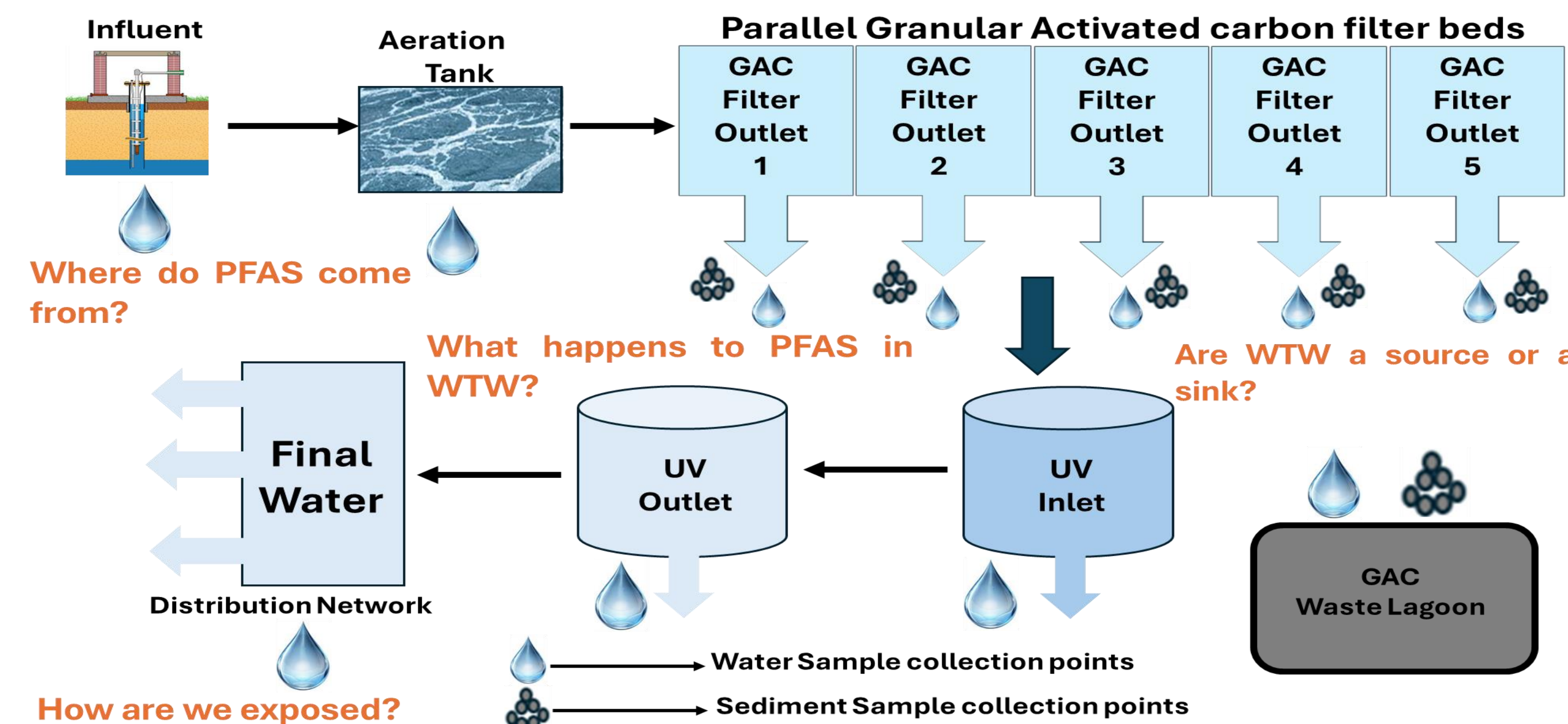
GAC: Granular Activated Carbon | PAC: Powdered Activated Carbon | IX: Ion Exchange
 RO: Reverse Osmosis | NF: Nanofiltration | EO: Electrochemical Oxidation | SCWO: Supercritical Water Oxidation

Research Novelty

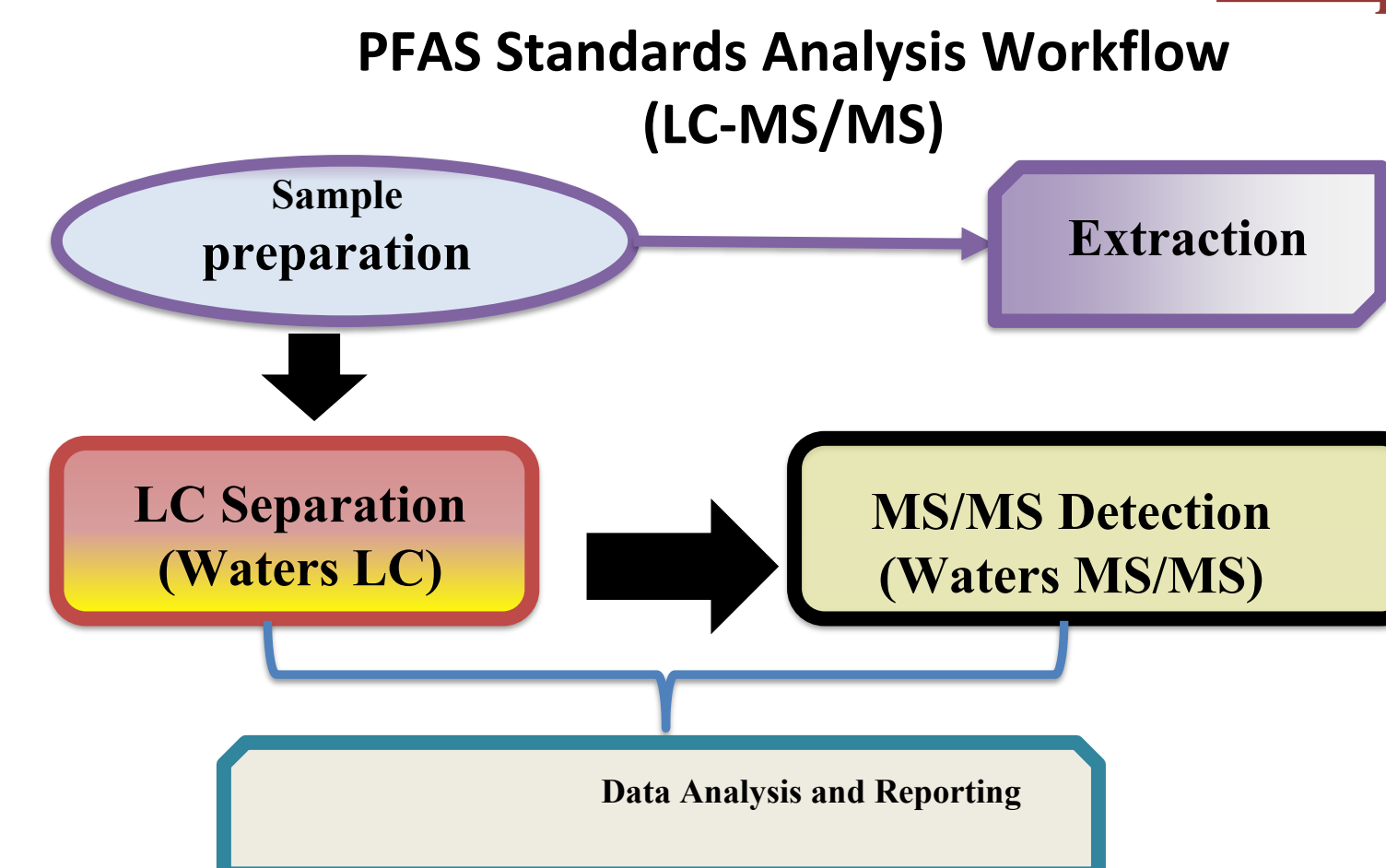
- Measure Concentrations.
- Track PFAS Movement.
- Identify Sources & Sinks.
- Develop System-Based Mass Balance.

- ❖ Integrates PFAS occurrence, transport, partitioning, and treatment performance within a single systems-based mass balance framework.

Methodology



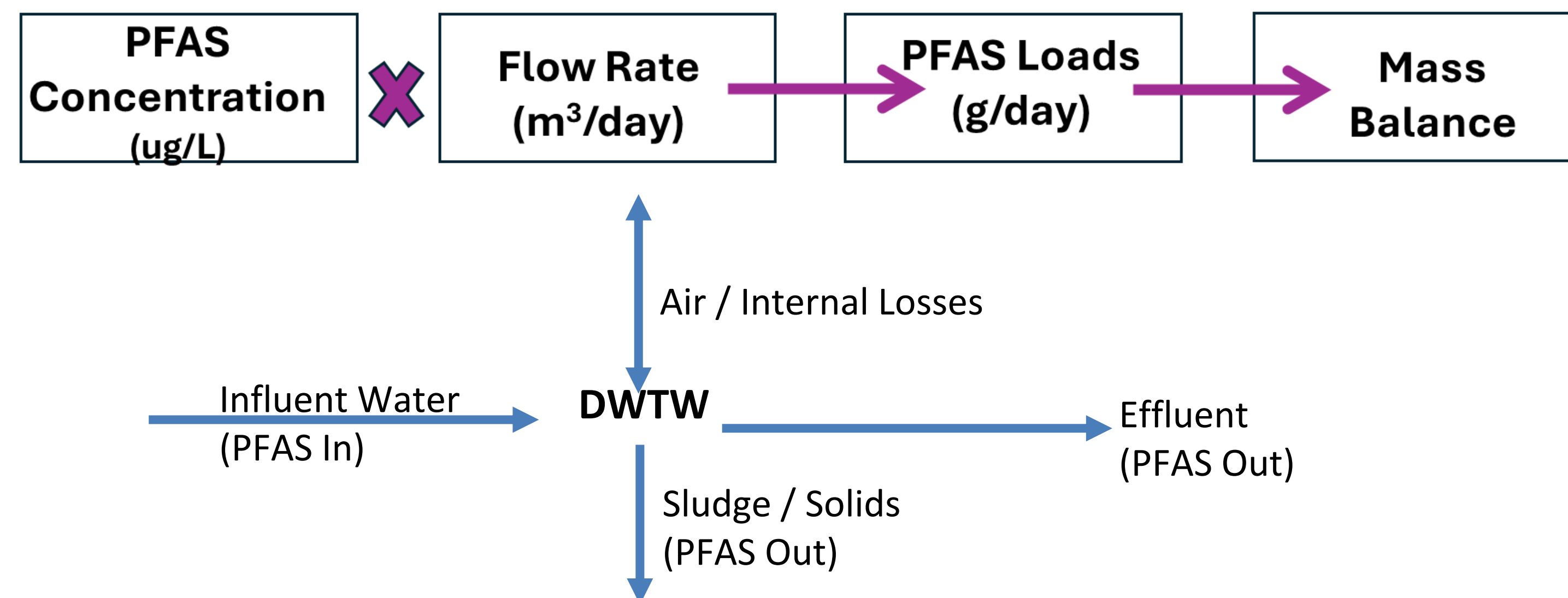
Sample Analysis



- US EPA Method 537.1
- LC-MS/MS (Waters Xevo QQQ-UPLC-MS)
- 48 PFAS Target analytes

PFAS Mass Balance Framework

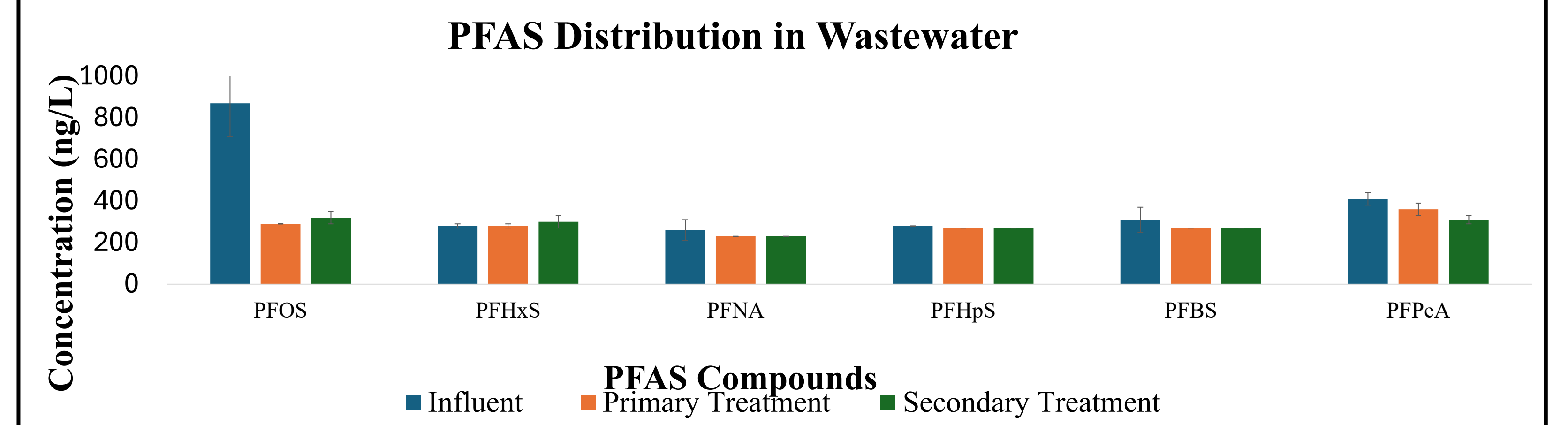
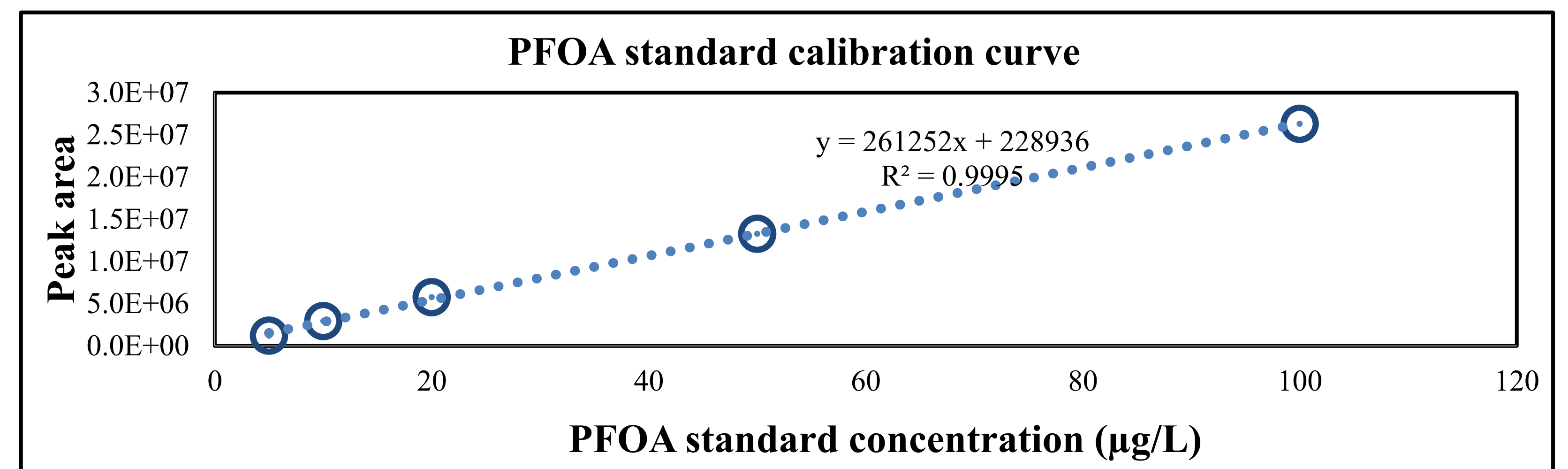
Conceptual Model



Total mass balance: Total PFAS mass in = Total PFAS mass out
 + Accumulated mass in sinks + Volatilization losses.

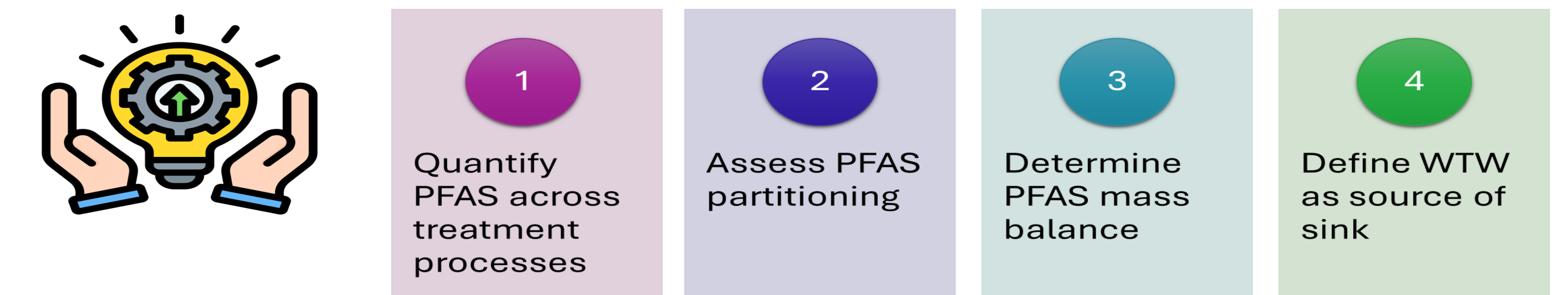
For further information:
 m.adagayi2@ncl.ac.uk

Preliminary Results



- ❖ Calibration concentrations were selected to encompass environmentally relevant PFAS concentrations reported in drinking water and wastewater studies while maintaining detector linearity.
- ❖ Initial analyses show the successful detection of multiple PFAS compounds in environmental samples.

Future Work



References

- Panieri, E., Baralic, K., Djukic-Cosic, D., Buha Djordjevic, A., Saso, L. (2021). PFAS Molecules: A Major Concern for the Human Health and the Environment. Toxics 2022, 10, 44. <https://doi.org/10.3390/toxics10020044>
- US Environmental Protection Agency (EPA). (2024). Method 1633 Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS (2024). EPA 821-R-24-001. Washington, D.C