

Navigating EPA Method 1621: A Roundtable Discussion Summary on AOF, Analytical Complexity, and the Future of PFAS Testing

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Introduction

EPA Method 1621 represents a pivotal step in advancing the non-targeted detection of per- and polyfluoroalkyl substances (PFAS). Developed to measure adsorbable organic fluorine (AOF) in water, the method uses combustion ion chromatography (CIC) as a screening tool that complements existing targeted PFAS methods like EPA Method 1633. To explore its implications and field questions from the analytical community, a panel of PFAS experts came together for a virtual panel discussion that brought together scientists, lab managers, and strategy leaders for an in-depth conversation on method performance, regulatory implications, and the collaborative future of PFAS testing.

What analytical gap does EPA Method 1621 fill? The method was developed in response to the need for a comprehensive screening tool to detect the vast array of PFAS compounds present in environmental samples. With thousands of PFAS variants in circulation, targeted methods alone can't capture the full picture. Method 1621 measures AOF as a proxy for total PFAS, providing insight into what targeted methods may miss.

What are the main applications of Method 1621? Originally written for Clean Water Act applications, Method 1621 is intended for use with wastewater samples, helping assess total PFAS loadings from industrial and municipal discharges. It serves as a complementary method to targeted testing, particularly in situations where traditional analyses may underestimate PFAS presence.

How do AOF results compare with targeted PFAS measurements? Case studies show AOF concentrations often exceed targeted PFAS results by 50 to 3,000 times. In one municipal wastewater survey, targeted methods captured less than 2% of the total fluorine indicated by AOF. This suggests that significant quantities of unknown or unmonitored fluorinated compounds are present.

What technical challenges do labs face? Inorganic fluoride is a persistent challenge—it can interfere with combustion analysis and drive detection limits upward. Although the method includes a sodium nitrate wash to mitigate this, results vary with sample matrix. Total organic carbon, suspended solids, and chloride levels can also affect retention and

measurement. Clean laboratory practices, including frequent blank checks and material pre-treatment, are essential for reliable data.

Why is Section 12 of Method 1621 so controversial? Section 12 gives labs flexibility in whether to analyze primary and secondary cartridges separately or together. However, the guidance on when to do each is vague, leading to uncertainty and inconsistent cost structures. Without clear direction from regulators, labs are left to make interpretive choices that could affect data comparability and cost recovery.

What about ultra-short-chain PFAS? The method has limited capability to detect ultra-short-chain compounds like trifluoroacetic acid (TFA). These hydrophilic molecules are poorly retained on carbon during sample preparation, resulting in low recoveries. While AOF can provide a broad view of PFAS, it is not ideal for every class of compound.

How does AOF compare with EOF? AOF measures adsorbed organic fluorine on carbon, typically in water matrices. EOF (extractable organic fluorine), on the other hand, involves extracting PFAS from a sample before CIC analysis. EOF may align more closely with targeted methods but comes with higher background and complexity. Both approaches are complementary and contribute to a more complete PFAS mass balance.

Can this method be used for air monitoring? While not yet common, CIC is being explored as a tool for analyzing air samples via OTM 45 and other extraction methods. Challenges include extremely low PFAS concentrations in air and difficulty separating inorganic and organic fluorine, but early experiments are underway.

What is the current regulatory status of Method 1621? As of now, Method 1621 is not approved for Clean Water Act compliance. It must go through the EPA's rulemaking process before it becomes mandatory for reporting. However, several states are already referencing the method in permits as a "report-only" requirement to monitor total PFAS contributions.

Conclusion

EPA Method 1621 works as a valuable tool to the PFAS analytical toolbox. While it is not a silver bullet, it enhances the ability to assess total PFAS loading and uncover hidden contributors. Used alongside targeted LC-MS/MS, TOP assays, and EOF measurements, it plays an essential role in establishing fluorine mass balance and informing remediation

strategies. As PFAS regulation evolves, collaboration and transparency across the industry will be vital to ensure that no significant contributors go unnoticed.

Contributors from the live event

Jay Gandhi, Environmental Market Manager, Metrohm USA

Bharat Chandramouli, Product Director, North America SGS

Chris Impellitteri, Director of R&D, The Water Tower

Chuck Neslund, Scientific Officer, Eurofins (retired)

Nick Nigro, PFAS Product Manager, Pace Analytical