Field Deployment of FRED-PFAS: a Portable Unit for Measuring Total PFAS in the Field

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With over 50,000 potentially contaminated PFAS sites identified so far in North America as of May 2024 (EWG, 2024), there is a strong need for advances in PFAS monitoring technologies to enable rapid, accurate and broadly accessible surveillance for PFAS identification, destruction, and remediation efforts. Traditional PFAS monitoring technologies utilize combustion ion chromatography (e.g., TOF) or liquid-chromatography mass-spectrometry (e.g., EPA 537.1 and 1633) techniques, which are expensive, require highly trained personnel, and are confined to analytical laboratory settings. This makes PFAS data difficult, slow, cumbersome, and expensive to acquire, with turnaround times ranging from weeks to months. With ever increasing site numbers and backlogs at analytical laboratory facilities, it is critical that industry has new tools to assess PFAS contamination, with on-site screening tools being particularly crucial to helping speed up processes.

FREDsense Technologies has developed such a screening tool: FRED-PFAS. The system utilizes a custom polymeric binding system capable of detecting the fluorocarbon chains that make PFAS so unique. This polymer produces a high level of fluorescence that decreases in a dose-dependent manner when exposed to PFAS compounds. When combined with a modified solid phase extraction (SPE) process, the system can reach ppt-level detection limits and has been demonstrated on multiple sample matrices, including AFFF rinsates, industrial wastewater, groundwater, and more. The sensor shows detection of a wide range of PFAS compounds, performing best on analytes with four to twelve carbons. Strong signals can be seen with EPA-6 analytes such as PFOA and PFOS. The sensor has been tested on a wide variety of potential interferences showing strong selectivity although some issues being found with high parts per million metals and detergent concentrations.

This talk will highlight the technical validation of the FRED-PFAS system, particularly direct data comparisons that have been done to EPA 1633, TOF and Total Oxidizable Precursor (TOP) assays. We will also cover a recent case study detailing the results from the FRED-PFAS system at an AFFF-impacted facility. This was an in-field pilot where the FRED-PFAS system was directly compared to third party analytical lab data across a number of samples. Strong correlation of FRED-PFAS results to analytical methods was seen across samples. We will cover different use cases for rapid PFAS data and discuss the significant benefits that in-field analysis can provide.

Learning objectives for this presentation include developing an understanding of current challenges for PFAS analysis, understanding the value of field-based analysis, and understanding how field screening unlocks dynamic investigation approaches. We will share performance data of the sensor technology including correlation data against gold- standard methods such as EPA 1633 and TOF (R2 > 0.9). Case study results will also be presented, including a demonstration of the benefits of implementing on-site PFAS monitoring in an investigation/remedial application, with a focus on increased operational efficiency and projected long term value for implementing such a monitoring system on one and multiple sites. Field screening tools are a critical piece to solving the PFAS puzzle.

Margaret Renaud-Young

Maggie is a researcher, project manager and entrepreneur having worked in the fields of medicine and chemistry, and cofounding FREDsense Technologies. In her career she has used a variety of analytical approaches investigating mechanisms of cancer development and designing and testing drug and toxin biosensors. With over two decades of experience in research in the fields of biology and chemistry she has authored both academic publications and patents in both fundamental studies and sensor development. In her Lead Scientist role at FREDsense Technologies, she directs the Research and Development team to continue technical innovations of the FRED-PFAS sensor.