

## Application of a PFAS Mobile Laboratory Enables Dynamic Work Strategies at PFAS Site

*Michael Rossi* (mrossi@cascade-env.com), Helmer Korb, and Seth Pitkin  
(Cascade, Montpelier, VT, USA)  
Joseph Quinnan, Patrick Curry, and Alex Villhauer (Arcadis, Novi, MI, USA)

**Background/Objectives.** The benefits of flux-based conceptual models derived from high-resolution site characterization are well understood – results indicate that more than 75% of contaminant discharge is focused in 5 to 10 percent of aquifer volume (Guilbeault, 2004). For chlorinated solvents and fuels, the ability to quickly identify these regions of highest flux has been greatly enhanced via the use of several direct screening tools which, when combined with more quantitative measurement tools, can provide a sufficient understanding needed for successful site management. However, for PFAS these direct screening tools do not work for a variety of reasons and although there are several field chemistry techniques evolving, none of these methods have the sensitivity nor selectivity to adequately satisfy the objectives of PFAS site investigations. The known complexities related to the fate and transport of PFAS, coupled with their persistence and toxicity at low levels, present a need for rapid, dynamic, high resolution site characterization (HRSC) approaches which can cost effectively define the nature and scope of the required remedies. In order to achieve a rapid, single mobilization investigation of a PFAS site, the authors deployed a mobile LC/MS/MS laboratory to analyze site specific PFAS compounds in groundwater at single digit part per trillion (ppt) levels. The laboratory was able to meet all of the site's data quality objectives and provide defensible, cost effective analytical data that facilitated the adaptive sampling strategy used for this investigation.

**Approach/Activities.** The subject investigation involved a former chrome plating facility at a Revitalizing Auto Communities Environmental Response (RACER) Trust site in Lansing MI. The investigation was focused on determining the horizontal extend of PFAS contamination in a shallow (perched) groundwater system. Prior to this investigation, there was limited PFAS information and the distribution of PFAS was poorly understood. A maximum concentration of 14,000 ppt was observed in a source area monitoring well and levels in nearby wells were all below 1000 ppt. The primary PFAS present was perfluorooctanesulfonic acid (PFOS); the required detection limit for the onsite lab was set to 12 ppt based on Michigan DEQ's GW standard PFOS. In order to assess the PFAS levels and distribution, a dynamic sampling strategy involving two groundwater sampling teams was used to maximize the cost effectiveness of the onsite lab and minimize the duration of the investigation.

**Results/Lessons Learned.** Over the course of two and one half days 31 groundwater samples were collected and analyzed by the onsite LC/MS/MS laboratory. Additional QC samples were collected to ensure no cross contamination (derived from drilling fluids and sampling materials) occurred during the drilling and sampling activities. The laboratory used an accelerated solid phase extraction sample prep technique followed by LC/MS/MS analyses that are based on EPA Method 537. Analytical results were typically reported within four hours of sample receipt with additional analyses run on the autosampler overnight to cover dilutions; on average, 33 analytical runs (includes QC) per day were needed to cover the concentrations observed in these samples. Concentrations of PFAS compounds ranged between non-detect (@ 5 ppt) values and 7,000 ppt. Although several challenges were encountered during this investigation, all were overcome and the project's goals were achieved in a cost effective and timely manner. Additional information on method optimization and lessons learned will be discussed as part of this presentation.