# PFAS Insight™ PASSIVE SAMPLING TECHNOLOGY

## Offers time-integrated results and reduction of investigation-derived waste

Passive samplers have been invaluable for measuring bioavailable contaminants in natural waters for decades. Applications for the samplers include site assessment, long-term monitoring, and risk assessment and food web modeling.

What makes passive sampling particularly beneficial in these applications is improved detection limits when compared to grab sampling, time-integrated results and easy separation of only the most bioavailable, freely dissolved fraction of the contaminants. All these benefits translate into more reliable sampling at a reduced cost.

### THE CHALLENGE OF PFAS

When it comes to per- and polyfluoroalkyl substances (PFAS), traditional water sampling methods suffer from a high potential for cross-contamination due to the reuse of sampling equipment (e.g., pumps), as well as the presence of Teflon parts in many types of field sampling devices. Additionally, traditional groundwater sampling methods result in large volumes of investigation-derived waste (IDW), which is difficult and expensive to dispose of and can lead to stockpiled waste.

The chemical properties of PFAS—relatively high solubility in water, surfactant properties and strongly variable molecular sizes—make legacy passive samplers unsuitable to PFAS.

### OUR TECHNOLOGY

Battelle has come up with a solution to this challenge with our PFAS Insight™ technology. This patent-pending passive sampler consists of a polymeric sorbent suitable for adsorbing neutral and ionic PFAS from a variety of aquatic environments.

Different geometries of the PFAS Insight sampler hardware have been designed to fit various applications, including groundwater monitoring wells (Figure 1a) and surface water/porewater sampling (Figure 1b). We also are designing a sampler that can be used for sediment porewater sampling.

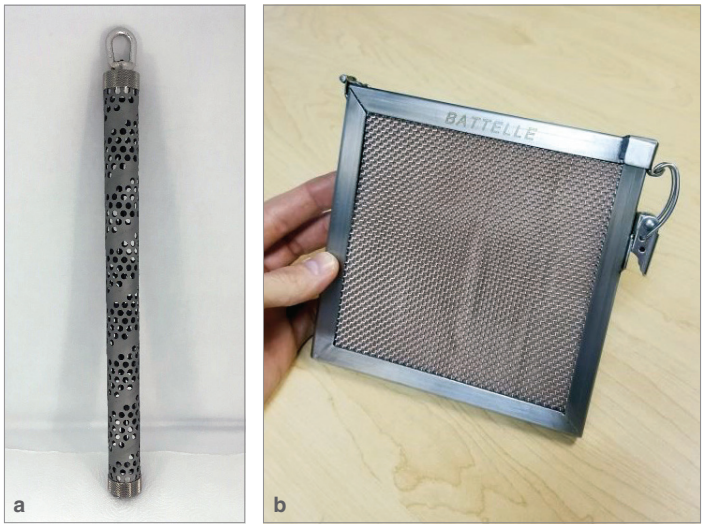


**Figure 1. PFAS Insight sampler for groundwater (a) and sampler for surface water (b)**

### HOW IT WORKS

The passive samplers are delivered to the study site assembled and ready to deploy. No special training is required for installation and retrieval.

After being deployed at the site for about one month, the samplers can be shipped to our laboratory, where sorbent will be retrieved, extracted and analyzed, and the results will be converted into equilibrium water concentrations using laboratory-derived partition coefficients. This translates to significant cost savings because the results obtained with our device are time-integrated and representative, and longer-term concentration data can be achieved with a fewer number of samples.

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## THE DATA

Field deployments conducted to date demonstrated a high degree of agreement between the PFAS Insight results and the results of grab water sampling analysis, with the majority of the surface water and more than half of the groundwater results agreeing within five-fold, as bound by the dashed lines in Figure 2.

It should be noted that the two types of measurements are not equivalent because:

- The passive sampler only measured the freely dissolved (unbound) fraction of PFAS, which may be different at each sampling location, whereas grab samples measure the total PFAS
- The passive sampler results are time-integrated, whereas the grab water sampling results only represent the concentrations at one or two specific times

The purpose of this plot is not to provide a quantitative accuracy assessment, but rather to showcase the general agreement trend between the two methods. For a subset of groundwater wells, the passive sampler results were lower than those obtained from grab water sample analysis indicating that a big fraction of PFAS is not in its most bioavailable, freely dissolved form and/or that slow recharge of water into these wells resulted in incomplete equilibration of the passive samplers.

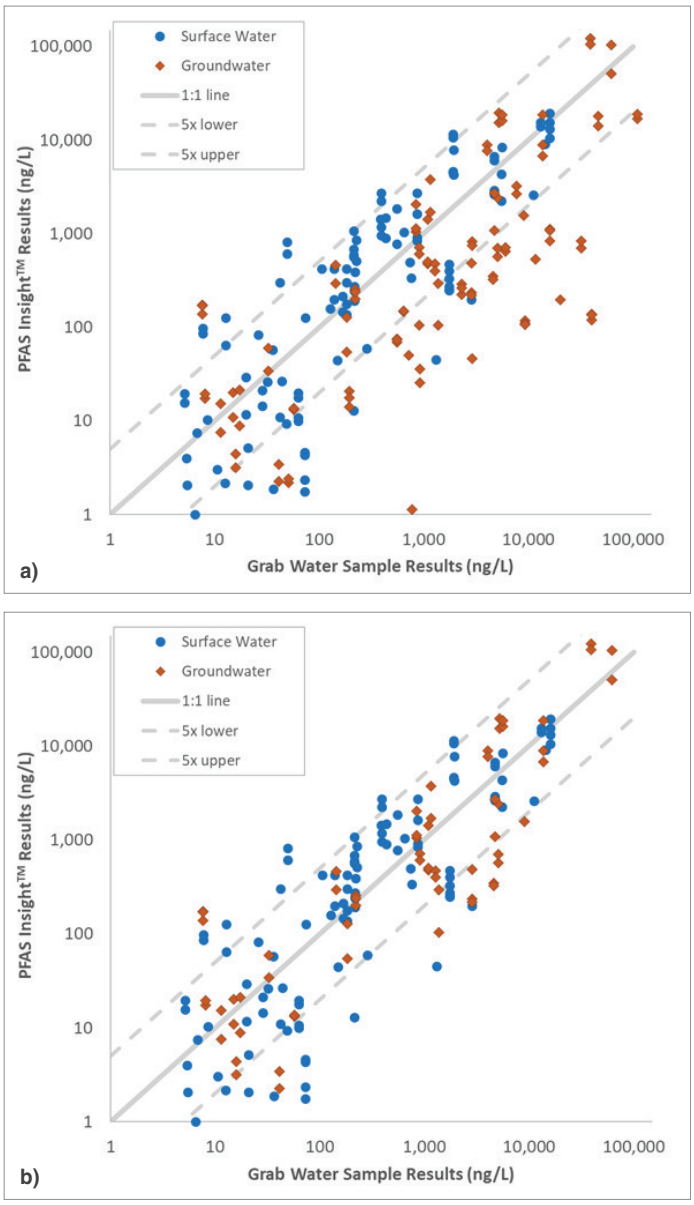


**Figure 2. Comparison of PFAS Insight and grab water sampling analysis results**

**a) All results collected to date, b) All results except the monitoring wells where PFAS uptake by the passive sampler is suspected to be be significantly impacted by limited PFAS bioavailablity and/or slow well recharge.**

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**800.201.2011 | solutions@battelle.org | www.battelle.org/pfas**

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ID 696 09/20