PROJECT ID:
630

Passive Samplers for Improved PFAS Source Identification

Contractors performing groundwater sampling at a remediation site. Highly specialized training and equipment is used to collect ground water samples.
(Image Credit: U.S. Navy photo by Mass Communication Specialist 1st Class Glenn Slaughter).

OBJECTIVE

The objective of this proposed effort aims to identify, demonstrate and evaluate promising per- and polyfluoroalkyl substances (PFAS) passive sampling technologies for monitoring and fingerprinting PFAS source areas.

PROBLEM STATEMENT

The Navy is working to identify PFAS sources and assess areas of impact to prioritize treatment and appropriately manage the Navy's financial liability at PFAS impacted sites. PFAS fingerprinting, a chemical technique that compares compound detection in source areas to receiving environments, can identify potential PFAS sources. PFAS fingerprinting is a promising approach for source identification, but the required data quality for accurate fingerprinting (e.g., minimum detection limits, number of PFAS detected) is challenging to meet with traditional sampling strategies, especially with regards to sampling in the vadose zone.

DESCRIPTION

Currently, there are limited tools available to monitor solute and water flux in the vadose zone, hindering the ability to establish evidence-based links between surface sources of PFAS and impacted groundwater. This also complicates assessments of Navy liability and the effectiveness of PFAS treatments in impacted groundwater. Challenges remain in detecting PFAS, particularly when only a few compounds are targeted. This project aims to enhance PFAS fingerprinting by using passive samplers to detect a broader range of PFAS constituents.

Passive sampling methods, already used for assessing chemicals like metals and organic pollutants, have been advanced through significant investments by the Department of Defense. These technologies are becoming commercially available, and their potential for improving PFAS fingerprinting is promising. The project will first generate a peer-reviewed white paper comparing current PFAS passive sampling technologies, focusing on successful SERDP projects. The paper will evaluate each technology's ease of use, commercialization status, analysis simplicity, reliability, and comparability with traditional sampling

methods like grab samples. The goal is to determine which environmental matrices (e.g., water, soil, etc.) are best suited and whether these technologies improve PFAS detection to facilitate robust PFAS fingerprinting.

Provided the sampling technologies are mature enough, Task 2 will evaluate up to two promising PFAS passive sampling technologies at a PFAS-impacted site. These technologies will be tested alongside traditional grab sampling methods to assess their effectiveness in improving PFAS fingerprinting using standard EPA 1633 analytical methodologies. Comparisons conducted between the passive samplers and the standard grab sample methods will be grouped by depth and time to see how sensitive these techniques are. Additionally, to evaluate ease of use of the passive samplers, a comparison between novice deployment teams against trained project team members will be made to determine if bias is introduced via the difficulty of the sampling methods.

RETURN ON INVESTMENT

This project addresses key PFAS monitoring challenges and improving the Navy's ability to track sources and prioritize *in-situ* remediation. Passive sampling reduces the need for labor-intensive methods, simplifies sample preparation and analysis, and minimizes errors, all of which streamline decision-making and lower monitoring costs. If passive sampling reduces remediation costs by 20%, the Navy could save an estimated $5–$70 million across its installations. These technologies also support broader PFAS detection, improving liability assessments, treatment evaluation, and overall environmental management efficiency while boosting regulatory compliance.

NAVY BENEFITS

Passive sampling has the potential to offer key advantages for Navy PFAS monitoring, including ease of use, improved spatial resolution, time-weighted averages, reduced waste, and fewer QA/QC issues. PFAS fingerprinting through passive sampling may enable source identification, enabling more targeted and cost-effective cleanup strategies.

TRANSITION DESCRIPTION

A peer-reviewed publication will document a comprehensive literature review of PFAS passive sampling technologies. Field-testing results will be summarized in a final NESDI report, including a user's guide and SOP for the most effective sampler. Findings will be shared at key conferences (e.g., ESTCP/SERDP, Society of Environmental Toxicology and Chemistry - SETAC, Battelle's Bioremediation Conference) and with the Emerging Contaminant Workgroup. Navy RPMs at PFAS-impacted sites will be engaged and can use this information to support PFAS monitoring during Remedial Investigations.

CONTACT

For more specific information about this project, contact the Principal Investigator at nicholas.t.hayman.civ@us.navy.mil.

ABOUT THE NESDI PROGRAM

The Navy Environmental Sustainability Development to Integration (NESDI) program is the Navy's environmental research and development demonstration and validation program, sponsored by Office of the Chief of Naval Operations (OPNAV) Compliance and Mission Readiness Division (N4I1) and managed by the Naval Facilities Engineering Systems Command (NAVFAC) from the Engineering and Expeditionary Warfare Center (EXWC) in Port Hueneme, CA.

The mission of the NESDI program is to support Fleet readiness by minimizing operational constraints associated with environmental and human health risks and to reduce cost of environmental compliance by demonstrating, validating, and integrating innovative technologies, processes, materials, and by filling knowledge gaps.

For more information, visit the program's web site at www.navfac.navy.mil/nesdi
or contact the NESDI Program Managers at NESDI.fct@navy.mil