Demonstration and Application of Amendments for PFAS In-situ Stabilization in Sediments

PROJECT ID:
637

AquaGate+ amendments being deployed at a Navy site. This NESDI effort will build off previous DoW RDT&E investments to apply this technology for these persistent compounds. (Photo Credit: Courtesy of ESTCP project no. ER-201131).

OBJECTIVE

The objective of this project is to demonstrate and field-validate performance, placement, and stability of a composite particle form of reactive amendments for *in situ* treatment of per- and polyfluoroalkyl substances (PFAS) impacted sediments at Navy facilities.

PROBLEM STATEMENT

PFAS-impacted sediments pose both a financial and environmental liability for the Navy. Traditional methods like dredging, capping, and activated carbon amendments have been applied to other contaminants but remain largely untested for PFAS in sediments. Groundwater-to-surface water pathways further complicate contamination, and while some sites have piloted colloidal activated carbon, this approach is not always feasible. Active sediment amendments and practical, full-scale solutions are urgently needed to enable effective, sustainable PFAS remediation across Navy sediment sites.

DESCRIPTION

This project will demonstrate the use of sorptive amendments to reduce PFAS in sediments. Proven materials such as RemBind®, FLUORO-SORB®, and powdered activated carbon will be delivered using the AquaGate+ system, which distributes amendments evenly across sediment surfaces. Unlike dredging or capping, this approach allows amendments to gradually mix into the sediment through natural processes, binding PFAS and making them unavailable to aquatic organisms.

Amendments that perform well in laboratory testing will be incorporated into AquaGate+ particles and evaluated in a three-month field demonstration. The effort will use NIWC's Remedy and Recontamination Assessment (RARA) Array to bridge laboratory findings with field-scale application, ensuring reliable data on amendment effectiveness.

Sediment will be collected from up to three Navy sites, prioritizing areas with potential PFAS impacts from groundwater-to-surface water

pathways. Laboratory exposures will test up to three amendments (plus a control) using benthic organisms and passive samplers. Based on results, one Navy site will be selected for *in situ* demonstration, with the two best-performing and cost-effective amendments carried forward.

Field testing will evaluate amendment performance under real-world conditions, with data collected to measure reductions in PFAS bioavailability. Analytical work will primarily be performed at NIWC Pacific, with some supporting analyses outsourced as needed.

AquaBlok Ltd.'s composite particle technology will provide uniform, precise placement of amendments, ensuring effectiveness while minimizing disruption to sensitive environments. By combining proven sorbents with a reliable delivery system, this project will generate critical data to inform practical, field-ready solutions for PFAS-contaminated sediments across Navy facilities.

RETURN ON INVESTMENT

This project offers significant cost savings and risk reductions for the Navy. PFAS-impacted sediments carry a $2B+ liability, and traditional methods like dredging or capping are expensive, disruptive, and environmentally intensive. *In situ* delivery of reactive amendments via AquaGate+ has the potential to provide a lower-cost, minimally invasive alternative that can reduce remediation costs by 30–60%, limit long-term monitoring, and avoid off-site disposal. This strategy uses less energy and protects sensitive ecosystems. It delivers a scalable approach for future Navy sediment remediation efforts.

NAVY BENEFITS

The Navy faces growing pressure to address PFAS-impacted sediments, especially in active harbors where dredging or capping may be costly or disruptive. Using AquaGate+ to deliver reactive amendments offers a practical, *in situ* alternative that binds PFAS directly in sediments, reducing exposure while avoiding large-scale dredging. This approach has the potential to lower cleanup costs and minimize impacts to marine ecosystems. Demonstrations will also integrate bioavailability-based monitoring, ensuring effective risk reduction. Benefits include cost savings, reduced monitoring needs, environment protection, and the ability to remediate challenging areas like under-pier sites.

TRANSITION DESCRIPTION

NIWC Pacific and AquaBlok, Ltd. will transition *in situ* treatment and reactive capping technologies through peer-reviewed publications, Navy RPM newsletters, NAVFAC workgroups, and major conferences. Validated methods will be advanced commercially by AquaBlok, ensuring broader application across Navy sediment remediation projects.

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@us.navy.mil