AFCEC Environmental Restoration Innovative Technology Projects

Ongoing Projects

FY	BAA ID	Title	Contractor/PI	Synopsis
2022	BAA2203	On-site removal and destruction of PFAS using Surface Active Foam Fractionation and DeFluoro Technologies	Allonia Kent Sorenson	Demonstrate a cost-effective, sustainable, on-site separation, concentration, and destruction solution for regulated PFAS compounds in surface water and/or groundwater at Hanscom AFB. The demonstration will represent the first ever coupling of SAFF® and DE-FLUORO™ for a complete on-site treatment process.
2022	BAA2213	Tempe cell method for PFAS leaching	Arcadis Joseph Quinnan	Develop and validate a leaching method using Tempe cells by extending the retention curve analysis to allow sampling of porewater from intact cores under controlled conditions. Validation of the method will be completed using two primary lines of evidence: comparison with lysimeter porewater sampling through intact cores collected proximal to prior lysimeters and comparison of transient water release and imbibition sampling at various points on the soil moisture retention curve and numerical simulations. The goal is to develop a commercial method of leaching tests that can be reliably conducted by contract laboratories, enabling widespread adoption by practitioners and providing a realistic estimate of leaching potential for vadose zone soils containing PFAS.
2022	BAA2215	Osorb Passive Samplers for PFAS in Groundwater and Surface Water	Arcadis Theresa Olechiw	The project will build upon the initial field testing of the Osorb passive sampler through a robust demonstration at multiple sites. The project will collect sufficient field data in ground and surface water over a range of environmental variables to assess the optimal use of passive sampler results for various applications (e.g., screening evaluations, risk assessments, and remedial action performance monitoring). Ultimately, the project will facilitate commercialization of analysis and promote adoption of the passive sampler for widespread use.
2022	BAA2217	Field Validation of a Modified HYDRUS Model for Simulating PFAS Leaching in the Vadose Zone	Arclight Jeff Silva	Develop a methodology for modeling PFAS fate and transport in vadose zones, particularly for charactering the transport between the source zones and the groundwater table. Specifically, this project will evaluate, demonstrate, and validate the use of the commercially available and widely used HYDRUS unsaturated flow and transport model for use at F.E. Warren AFB, WY.
2022	BAA2224	In Situ Treatment of PFAS-Impacted Stormwater Emanating from AFFF Source Areas	CDM Smith Charles Schaefer	Demonstrate the use of commercially available, engineered pre-cast concrete vaults to divert, capture, and remove PFAS present in stormwater in situ in an easy-to-implement and cost-effective manner at Dobbins ARB, GA. This project proposes to treat PFAS-impacted stormwater in situ by diverting, capturing, and directly funneling stormwater outfall through pre-cast concrete vaults containing filtration and PFAS adsorption media.

FY	BAA ID	Title	Contractor/PI	Synopsis
2022	BAA2234	Can the REMChlor-MD Model be Used to Evaluate Passive and Active PFAS Remediation Alternatives?	GSI Charles J. Newell	Evaluate, demonstrate, and validate the innovative use of a commercially available fate-and-transport model for assessing PFAS fate and transport in the saturated zone. In particular, the project team will test the feasibility, reliability, and limitations of the existing REMChlor-MD groundwater remediation model for simulating PFAS plume migration and forecasting the future outcomes of active and passive PFAS plume remediation strategies.
2022	BAA2237	PFAS modeling	GSI Chin “Bill” Mok	Evaluate use of commercially available fate-and-transport (F&T) models for assessing PFAS F&T at industrial sites. Specifically, this project will evaluate, demonstrate, and validate the use of two readily available F&T modeling systems; the Transport of Unsaturated Groundwater and Heat (TOUGH) and MODFLOW with Un-Structed Grids (MODFLOW-USG) families of codes, for assessing PFAS persistence in the environment and migration from sources to receptors through the vadose zone and saturated zones.
2022	BAA2242	Demonstration of a Treatment Train with Foam Fractionation and Hydrated Electron for Cost-Effective Removal and Destruction of PFAS	Haley & Aldrich John Zhong Xiong	The objectives of this project are to: (1) Demonstrate the proposed treatment train for effective removal and destruction of PFAS in the source area groundwater; (2) Optimize the on-site PFAS treatment train unit using the field test data collected at March ARB; (3) Generate field cost and performance data to aid in estimating costs at full-scale; (4) Evaluate and demonstrate the cost-effectiveness of the proposed treatment train compared to other remediation options; and (5) Transfer the technology and knowledge to site project managers, technical support staff, contractors, and the environmental industry. The treatment train proposed in this effort includes (1) a semi-continuous multi-stage foam fractionation system to remove (i.e., strip) and concentrate (i.e., enrich) PFAS from the feedwater source (e.g., extracted groundwater), and (2) an ultraviolet (UV)/sulfite system to destroy the concentrated PFAS.
2022	BAA2246	Rapid field-scale characterization of PFAS source zones with electrical geophysics	Rutgers Lee Slater	Fully demonstrate the capabilities of a field-scale electrical geophysical technique, known as spectral induced polarization, for rapid characterization of AFFF source zones.
2022	BAA2247	Treatment of PFAS in Mixed Media	Savron David Major	Demonstration/validation of smoldering treatment that was evaluated under the U.S. Department of Defense Strategic Environmental Research Development Program. The objectives of this project are: 1) Assess if exchange resins (IX) can serve as a fuel that supports smoldering-based combustion; 2) Generate performance data on the ability of smoldering combustion to treat PFAS and other co-contaminants in soils, granular activated carbon or IX to meet regulatory criteria, including the U.S. Environmental Protection Agency Lifetime Health Advisory for perfluorooctanoic acid and perfluorooctane sulfonic acid; and 3) Assess the impact of soil permeability, moisture content, soil type, and PFAS concentrations on treatment robustness and effectiveness.

FY	BAA ID	Title	Contractor/PI	Synopsis
2022	BAA2249	Retrofitting Stormwater Pond Outlets for Surface Water PFAS Remediation	SDSMT Joseph A. Quinnan – Arcadis	Design and retrofit an existing pond outlet structure at Fairchild AFB to remove PFAS from contaminated water as it is released downstream. The goal of the project is to develop a methodology that can be applied to other pond outlet structures with minimal effort. The conceptual design consists of a diversion box that will provide low pressure to force flow through a conduit filled with granulated activated carbon (GAC) media.
2022	BAA2276	Supercritical Water Oxidation Destruction of PFAS Concentrated Spent Media	Wood Dora Chiang	Use of Supercritical water oxidation (SCWO) to destroy PFAS waste streams generated through pump and treat remediation systems. SCWO is proposed to be demonstrated and validated at Air Force installations for on-site destruction of remediation derived PFAS wastes such as spent GAC, spent ion exchange resins, innovative sorbents, or other concentrate rejects.
2022	BAA2277	PFAS Treatment Gates for Surface Water Management in Drainage Systems	Wood Dora Chiang	Demonstrate PFAS treatment gates to reduce PFAS migration in drainage channels. The processes include two permeable filtration gates to pretreat and remove PFAS followed by one bioretention polishing gate for residual and shorter chain PFAS uptake. The pretreatment gate will utilize low-cost mixture of mulch, biochar or powered activated carbon to significantly reduce biological, natural organics, co-contaminants and PFAS loading to the primary treatment gate. The primary PFAS treatment gate will comprise AquGate+RemBind. RemBind has demonstrated high removal efficiency of PFAS and low PFAS leachability. The third “gate” is designed for plant uptake for residual and shorter chain PFAS. The three treatment gates in series have the functions of “pretreat, treat and polish” and will be designed to be low-cost, low O&M, green and replaceable.
2021	BAA2101	Integrated Analysis of Existing Data to Maximize High- Resolution Site Characterization Knowledge	GSI Chin “Bill” Mok	Fractured bedrock aquifers have proven to be difficult settings for remedial efforts. Due to the complex nature of these sites, groundwater plumes in fractured bedrock sites are typically more mature, dispersed over large areas, and penetrate deep into the subsurface; therefore, these sites often accrue high remedial and operational costs. In recent years, particulate carbon amendments (PCAs) have become more common in the environmental remediation industry, offering an alternative in-situ remedy with the benefits of contaminant sorption (typically activated carbon) and destruction (via and oxidizing/reducing agent or serving as a medium for microbial growth in situ). Complex chlorinated volatile organic compound (CVOC) sites could benefit from these PCA technologies to potentially address key obstacles such as back diffusion, dilute plumes, and complex geological settings. When combined with a high-resolution site characterization (HRSC) tools, PCA products have the potential to drastically improve remediation efforts at complex sites.

FY	BAA ID	Title	Contractor/PI	Synopsis
2021	BAA2102	Continuous Flow Field Pilot to Completely Mineralize PFAS in Groundwater	OXbyEL Ed Ricci	Design, build, and operate a scalable Electrolyzer pilot remediation system for PFAS impacted groundwater and validate performance through on-site treatability studies at Davis Monthan AFB, AZ. The key objectives are: 1) prove technology scalability for groundwater remediation; 2) assess the technology performance treating a variety of groundwater matrices impacted by complex geological heterogeneity; 3) validate PFAS mineralization effectiveness; 4) demonstrate co-contaminant mineralization effectiveness; 5) confirm continuous, single-pass flow-through operation; and 6) estimate operating and capital costs for a commercial treatment system.
2021	BAA2103	Ultrasound Technology for the Mineralization of PFAS	TetraTech Purshotam Juriasingani	Scale up laboratory-scale mineralization of PFAS using high-frequency ultrasound, to develop a commercial-scale device (100L) to treat high concentration PFAS waste. This project will develop an intermediate scale multi-transducer reactor (10L) which will be used in a series of trials to enable design of a larger pilot-scale (100L) sonochemical reactor for field-scale application.
2021	BAA2104	Field Demonstration of PFAS Destruction Using Supercritical Water Oxidation (SCWO)	Battelle Stephen Rosansky	Use of Supercritical water oxidation (SCWO) to destroy PFAS waste streams generated through pump and treat remediation systems. SCWO is proposed to be demonstrated and validated at Air Force installations for on-site destruction of remediation derived PFAS wastes such as spent GAC, spent ion exchange resins, innovative sorbents, or other concentrate rejects.
2021	BAA2105	Continuing to Evaluate the Mitigation of PFAS Leaching using Soil Stabilization via Novel Characterization Techniques	Arcadis Theresa Olechiw	Extension of BAA 120 project for PFAS stabilization in an AFFF-impacted source zone with post-stabilization performance monitoring. This project proposes to: 1) assess the leachability of stabilized soil over a longer duration to increase the degree of certainty to regulatory stakeholders regarding its permanence; 2) investigate, and potentially establish, stabilization mechanism(s) to enable further optimization of soil stabilization; and 3) potentially distinguish between surface-bound/potentially reversible and orbital overlapping/potentially irreversible mechanism(s).
2021	BAA2108	Mass Flux as a Tool to Assess the Need for PFAS Remediation	CDM Smith Charles E. Schaefer	Investigation of a former fire training area impacted with aqueous film forming foam (AFFF) with respect to PFAS leaching and subsequent impacts to underlying groundwater. Investigation tools include the use of porous cup suction lysimeters, groundwater transects, and bench-scale soil desorption testing. A key component of this study is to determine the PFAS vertical mass discharge through the unsaturated zone relative to the horizontal PFAS mass discharge emanating from the source area in shallow groundwater.
2021	BAA2112	Advanced Data Analytics and Forensics Framework and Demonstration: High-Resolution Site Characterization	CDM Smith Tamzen Macbeth	Develop an Advanced Data Analytics Forensics Framework (ADAFF) and guidance on using advanced analytics to support improved decision-making throughout the remedy lifecycle at complex sites.

FY	BAA ID	Title	Contractor/PI	Synopsis
2021	BAA2115	Comprehensive EVO/ERD-Focused Data Assessment Combined with Tailored HRSC and Data Interpretation Techniques	OTIE Manish M. Joshi	Demonstration and validation of the combined use of comprehensive data analyses, sequence stratigraphy, direct-push High Resolution Site Characterization (HRSC) technologies and analytical testing to better understand the behavior of emulsified vegetable oil (EVO) and contaminants over time at a chlorinated solvent contaminated site undergoing EVO-based enhanced reductive dechlorination.
2021	BAA2117	A pilot-scale, portable water treatment train for remediation of PFAS contamination	SDSMT Lisa Kunza	Develop and demonstrate a cost-effective, mobile PFAS removal/destruction treatment system to remediate contaminated water at sites. South Dakota School of Mines and Technology will construct and use a treatment train that integrates an innovative electrochemical system to address the needs for treating PFAS in contaminated media. The pilot scale unit will consist of three primary treatment components units mounted in mobile trailer: (a) Pressurized sand filter, a pre-treatment step to remove any suspended solids; (b) Electrochemical module, which is the destructive technology at the heart of the treatment; (c) Ion exchange module, to ensure no residual PFAS is released into the environment.
2021	BAA2123	PFAS Elimination from Waters and Soils	Univ. of Utah Andy Hong	This project addresses the need of PFAS-contaminated water and soil removal by demonstrating and verifying a novel Micro/Nanobubbles Aerator in conjunction with a novel Serial Venturi Reactor system to eliminate PFAS in a technically advanced, efficient, effective, sustainable, and cost-effective manner. The goal is to provide an effective, feasible, and sustainable treatment technology for PFAS-contaminated waters and soils. The objective is the complete mineralization of PFAS in a single process in a contained reactor.
2021	BAA2128	Cyclodextrin Sorbent and Electrochemical Oxidation Treatment Train for PFAS Separation and Destruction of PFAS in Groundwater	AECOM Holly Holbrook	Evaluation of a novel treatment train coupling two innovative technologies: PFAS removal via a cyclodextrin sorbent (DEXSORB+®) and electrochemical oxidation for PFAS destruction (DE-FLUOROTM). The project aimed at understanding the benefits and potential areas of improvement for this treatment train. The main goal was to demonstrate site operation of the treatment train and produce a sufficient volume of a PFAS-rich liquid that could be treated with DE-FLUOROTM's process. The combined results from bench-scale and field-scale demonstrations of the DEXSORB® and DE-FLUORO™ systems indicate that a treatment train combination of the technologies, including an evaporation step, with improvements in regenerant pretreatment and DE-FLUOROTM operation optimization, is feasible for further consideration and scale-up.