CDM Smith PFAS Research and Development

CDM Smith staff are **principal investigators (PI)** or **co-PIs** on the following research projects. These projects are helping us to gain understanding of how per- and polyfluoroalkyl substances (PFAS) behave in the environment, and identify new technologies to treat contaminated sites—including those that break down PFAS.

Media	Subject	Timeframe	Summary
Groundwater	FATE & TRANSPORT Investigation	2017 – 2020	▪ Studies PFAS fate and transport in groundwater at complex source-zone during biotic and abiotic transformation. ▪ Examines interactions between PFAS and co-contaminants during remediation, including *in situ* chemical oxidation, *in situ* chemical reduction, and biosparging. **Co-PI, ER-2720**
Groundwater, Soil	FATE & TRANSPORT Investigation	2018 – 2021	▪ Studies PFAS interactions with soil minerals and organic matter. ▪ Evaluates PFAS interaction when mixed with non-aqueous phase liquids trichloroethylene and JP4 jet propellant. ▪ Identifies the hydrogeological parameters under saturated and unsaturated conditions. **Co-PI, ER18-1259**
Groundwater, Soil	FATE & TRANSPORT Investigation	2018 – 2021	▪ Studies PFAS mass removal and mass discharge controlling process in the vadose zone and capillary fringe under variable saturation conditions. **PI, ER18-1204**
Groundwater, Soil	PFAS ANALYSIS Investigation	2019 – 2020	▪ Studies the potential use of nuclear magnetic resonance and complex resistivity as effective and rapid screening technologies for PFAS' assessment in soil, groundwater, and sediments. **Co-PI, ER19-1128**
Groundwater, Soil	PFAS ANALYSIS Investigation	Newly funded 2019	▪ Studies PFAS' improved analytical and environmental sampling techniques to assess and mitigate bias in PFAS levels during ground and surface water sampling. **Co-PI, ER19-1205**
Biosolids	FATE & TRANSPORT Investigation	Newly awarded 2019	▪ Assesses PFAS levels and release from finished, field aging biosolids (dissolved and colloidal) from multiple water resource recovery facilities. **PI, WRF e.p16**
Groundwater, Soil	FATE & TRANSPORT Investigation	2019 – 2020	▪ Studies the fate and transport of perfluoroalkyl precursors in soil and groundwater. ▪ Uses multiple analytical and fingerprinting tools. **PI, Confidential Client**
Groundwater, Water Treatment	DESTRUCTION Treatment Technology	Completed 2015	▪ Studied boron-doped diamond (BDD) electrodes as an electrochemical oxidation technology to destroy PFAS. ▪ Laboratory results regarding the defluorination of PFAS look promising. **PI, AFCEC**
Groundwater, Water Treatment	DESTRUCTION Treatment Technology	Completed 2015	▪ Electrochemical oxidation technology for perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) decomposition in groundwater. ▪ Used BDD and mixed metal oxide anodes to degrade perfluorinated compounds. ▪ Cofirmed efficient defluorination for PFOS and PFOA, with 98% and 58% recovery as fluoride. **PI, US Navy**
Groundwater	DESTRUCTION Treatment Technology	Completed 2018	▪ Studied electrocatalytic and catalytic approaches for *in situ* PFAS treatment. Eletrocatalytic: ruthenium oxide-coated titanium + mixed metal oxide anodes to oxidize PFAS. ▪ Catalytic: rhodium-based for the hydrodefluorination of PFAS. **PI, ER-2424**

Media	Subject	Timeframe	Summary
Groundwater; Investigation-Derived Waste	REMOVAL Treatment Technology	2017 – 2020	▪ Studies PFAS removal from investigation derived waste by sorbing into chitosan-modified montmorillonite nano-composite. **Co-PI, ER18-1526**
Water Treatment; Groundwater	REMOVAL Treatment Technology; DESTRUCTION Treatment Technology	2017 – 2020	▪ A field demonstration of PFAS removal by nanofiltration, then PFAS' destruction by sequential ultraviolet oxidative/reductive in reject water. **Co-PI, AFCEC BAA-031**
Groundwater	Management Tool	2018 – 2021	▪ Develops a decision support tool for PFAS treatment and destructive technologies. ▪ Compares various treatment scenarios using multiple metrics through life-cycle assessment (LCA) and costing basis. **Co-PI, ER18-5053**
Groundwater	REMOVAL Treatment Technology; DESTRUCTION Treatment Technology	2017 – 2020	▪ Couples regenerable ion-exchange resin and destruction (electrochemical and photochemical treatment) technologies for PFAS removal and destruction. ▪ Studies the influence of co-contaminants on resin adsorption of PFAS. ▪ Uses life-cycle cost analysis and LCA modeling throughout to guide experimental design decisions. **Co-PI, ER18-1063**
Groundwater	REMOVAL Treatment Technology; DESTRUCTION Treatment Technology	2018 – 2021	▪ Couples electrochemical coagulation with electrochemial oxidation to concentrate, then destroy PFAS in waters. **PI, ER18-1278**
Groundwater	REMOVAL Treatment Technology; DESTRUCTION Treatment Technology	2017 – 2021	▪ Couples ion-exchange resin with electrochemical oxidation for complete separation and destruction of PFOS and PFOA in groundwater. **PI, AFCEC BAA-108**
Food Production Animals	Risk Assessment	2019 – 2021	▪ Develops physiologically based pharmokinetic modeling tools to improve risk assessment and risk management capabilities for agricultural practice and food production. ▪ Collaborative effort with US and Australian regulators. **PI, funded by EPA Victoria, The Australian Government & CDM Smith**

Key CDM Smith PFAS Team Members