

Anthony J. Shields, P.E.

Project Engineer



Education and Credentials

M.S.E.E., Environmental Engineering, Temple University, Philadelphia, Pennsylvania, 2013

B.S.C.E., Civil Engineering, Temple University, Philadelphia, Pennsylvania, 2012

Professional Engineer, New Jersey (License No. 24GE05528500)

Continuing Education and Training

Hazardous Waste Operations and Emergency Response 40-Hour Certification (2014; refreshers 2015–2020)

First Aid and CPR certified (2019)

Transportation Worker Identification Card (TWIC), 2019

Freeport-McMoRan Resource Management Contractor Orientation Training (2019)

Delaware Valley Safety Council PetroChem+ and Site-Specific Safety Training

Professional Profile

Mr. Anthony Shields is a registered professional engineer with 7 years of experience in environmental engineering and consulting. Mr. Shields specializes in soil, soil vapor, and groundwater remediation and investigation in New Jersey, New York, and Pennsylvania and has extensive experience with the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program. He has provided engineering support for the design, construction, and operation of a wide variety of systems and remedial methods, including bioremediation systems, soil vapor extraction and air sparge systems, engineered capping, *in situ* chemical oxidation (ISCO) injections, sub-slab depressurization (SSD) systems, *in situ* stabilization (ISS), and excavation and disposal. Mr. Shields has additional experience in emerging contaminants such as per- and polyfluoroalkyl substances (PFAS) and 1,2,3-trichloropropane (1,2,3-TCP), treatment alternative options analysis, remedial investigations, cost estimation, air compliance permitting, and stormwater management. He also provides GIS and CAD drafting for environmental designs and technical reports.

Relevant Experience

Remediation and Environmental Permitting

Chlorinated Volatile Organic Compounds In Situ Biological Remediation and Vapor Intrusion for EPA Superfund Site, Southeastern Pennsylvania—Served as the field and project engineer for the remediation of a former door piston and specialty parts manufacturer. Chlorinated solvents previously used for parts manufacturing and testing had contaminated soils and groundwater in both the overburden and bedrock. In addition, chlorinated volatile organic compounds present at the site are part of a co-mingled plume of solvents. Assisted in the implementation of bioremediation via *in situ* bioaugmentation at the source area of the site. Served as project engineer for the post-injection groundwater monitoring events and provided engineering support for the evaluation of the pilot-study. Also provided engineering support for the determination of indoor air intrusion, and potential mitigation alternatives.

Dissolved Oxygen Injection System Design and Installation, Edison, New Jersey—Served as field engineer for the installation of a



dissolved oxygen *in situ* treatment system for the remediation of a petroleum/hydrocarbon release associated with a former bus garage and gas station. Leaking underground storage tanks (USTs) and other sources impacted soil and groundwater, with a groundwater plume extending more than 10 acres from the source area. Performed field oversight of the pilot system in the source area, which included the use of pneumatic fracturing and sand proppant to increase injection point area of influence. Assisted in design and installation for the full-scale system following the pilot study. Installed additional injection points throughout the property using pneumatic fracturing, as well as installing an offsite groundwater capture system for downgradient plume remediation.

ISCO Injection Implementation for Former UST Spill, Bridgeton, New Jersey—Project engineer for the implementation of ISCO injections to address hydrocarbon contamination in soil and groundwater from former petroleum USTs. Remedial activities consisted of gravity-fed injections of percarbonate oxidant (RegenOx®) into the subsurface to mitigate soil and groundwater contaminated with benzene, toluene, ethylbenzene, and xylenes. Additional injection support included the submittal of the NJDEP Permit-by-Rule and implementation of associated groundwater monitoring plan. Treatment is ongoing, and the site is anticipated to move to use of institutional controls (deed restriction) for soils and monitored natural attenuation for groundwater.

SSD System Design, Installation, and Operation and Maintenance, Millville, New Jersey—Project engineer for the installation of an SSD system to remediate trichloroethene (TCE) intrusion into an airport hangar and associated pilots' offices/lounge areas. Assisted in the review of historical investigations and conducted additional sampling/delineation. Provided support for the design and coordination of the installation of the SSD system following increased occupation of the impacted building. Conducted/coordinated confirmatory sampling and system operation and maintenance in accordance with NJDEP vapor intrusion technical guidance. Assisted in the drafting of NJDEP deliverables including the vapor intrusion response action report.

Excavation and Capping of a Former Specialty Gas Manufacturing Plant, East Rutherford, New Jersey—Provided field engineering support for an Industrial Site Recovery Act trigger of a specialty gas manufacturing facility. Historical fill throughout the site exceeded non-residential direct contact soil remediation standards while historical process operations leaked chlorinated solvents (tetrachloroethene [PCE]/TCE) as dense, nonaqueous-phase liquid (DNAPL) below the water table. Oversaw the excavation of hazardous impacted material in two zones of 10 and 20 ft below ground surface, requiring extensive dewatering activities and shoring/sheeting. Preparation work included demolition and asbestos abatement of the site structures. Following excavation and disposal, oversaw the installation of a site-wide permeable stone cap.

Industrial Facility Remedial Excavation, Edison, New Jersey—Performed field engineering support for the excavation activities at a former plastic manufacturer to remove soil impacted with multiple chlorinated solvents, including 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, methylene chloride, PCE and TCE. Excavation activities included foundation support utilizing helical piles for the warehouse building, which remained active during the remedial activities. The 12-ft-deep excavation yielded 810 tons of



impacted soil for offsite disposal. Following the source removal, provided groundwater monitoring and support for the submittal of a Classification Exception Area.

Former Manufactured Gas Plant ISS and Sediment Dredging Design, Coastal New Jersey—Served as field engineer and performed engineering support for the remediation of a former manufactured gas plant located in a coastal town in southern New Jersey. Remedial activities included the implementation of a deep soil mix *in situ* solidification/stabilization remedy to treat coal tar DNAPL adjacent to the bay side of the town. Provided oversight support of Phase I ISS activities, including the restoration of a public roadway, sidewalks, and utilities. Provided engineering support and technical drafting for remediation/dredging of the bay area's sediment exceedances. Additionally, provided engineering support for the removal of previously undocumented USTs discovered during the implementation of the Phase I ISS work. Conducted compliance permitting for dewatering water treatment plant, including New Jersey Pollutant Discharge Elimination System and local Municipal Utilities Authority permitting.

Remedial Investigation and Remedial Action Design at a Former Aviation Equipment Facility and Associated Airport, Millville, New Jersey—Provided engineering design of a three phase remedial action to address impact to groundwater from concentrations of PCE. Remedial phases included a shallow hot-spot excavation, targeted vadose zone soil vapor extraction systems, and a site-wide volatile organic compound cap. Supported additional groundwater remedial activities, including improvement and optimization of the existing groundwater *ex situ* treatment network and targeted ISCO injections within the source area and plume. Also performed initial investigation activities, including groundwater monitoring, soil delineation, sediment sampling, indoor air sampling, and operation/evaluation of an existing *ex situ* groundwater treatment system.

Air Permitting and Compliance for Non-Title V Facilities, Various Locations in New Jersey—Provided air permitting, calculations, and support for various Non-Title V facilities located throughout New Jersey, including a commercial vehicle distribution center, a vehicle painting and training center, a commercial wood painting facility, and a residential apartment complex. Engineering support included compliance work for NJDEP and various air permitting programs, including pre-construction permitting, general permits, emission statements, and Construction, Repair, and Maintenance Notifications. Also, performed facility-wide potential-to-emit calculations and calculated various facility inventory emissions, including boilers, above- and underground storage tanks, emergency generators, heaters, and painting booths.

Brownfield Program Property Development, Brooklyn, New York—Supported the transaction of a property and application into the New York State Brownfield Cleanup Program (NYSBCP). The property contained chlorinated volatile organic compounds associated with former dry cleaning and painting operations at the site. Helped to provide the buyer's team with a complete understanding of the site's environmental history and the process of entering into the NYSBCP, and to prepare the site for ongoing remedial investigation and remediation.



Emerging Contaminants

PFAS Remedial Investigation, New Jersey—Provided environmental support for investigation of PFAS in groundwater, drinking water, surface water, soil, and sediment. Provided engineering support involving potable water systems and mitigation. Collected groundwater using PFAS-specific sampling procedures. Assisting with investigation of potential third-party source contributions and providing litigation support.

Litigation Support for Potable Water Treatment Claims, San Bernardino and Stanislaus Counties, California—Conducted engineering design and cost estimation for well head treatment to address the occurrence of 1,2,3-TCP in potable water supply systems. Work included evaluation of municipal supply wells for treatment, design of granular activated carbon treatment systems and associated infrastructure, and generation of cost opinions for litigation support.

Stormwater

Stormwater Infiltration Improvements Design and Oversight for EPA Superfund Site, Southern New Jersey—Provided full-time oversight as the resident engineer for stormwater infiltration improvements at a former tannery and drum disposal facility. Remedial work from a previous consultant placed over-compacted backfill resulting in significant ponding and stormwater retention and flooding on the property, halting final installation of the remedial protective soil cap. Supported design work to implement stormwater management best management practices via a blended sand/site-soil mixture with a gravel surface layer to increase stormwater storage capacity and facilitate site infiltration. Provided onsite, day-to-day engineering support for the successful implementation of the redesigned cap and provided faster decision-making abilities for the construction management team.

Return Water Management System Design and Implementation at Former Sand Quarry, Sewell, New Jersey—Provided engineering support for the installation of a return water management system to renovate and repurpose the existing dewatering system. The former sand quarry was repurposed for research by a local university because the exposed soils were found to be of significant paleontological importance. Active paleontological research and digging is currently being performed at the site, and a new sustainable dewatering system of the quarry pit was necessary for long-term use. Provided design and engineering support to implement the 200,000–300,000 gal/day return water management system, which utilized sustainable design strategies and best management practices to pretreat the water to adjust pH and total suspended solids and discharge to a nearby surface water feature. Provided design drawings and technical specifications for the various engineered systems, including the lift station, force water mains, duplex pump system, valves and piping, electrical systems, and the gravel infiltration gallery.

Publications

Zhang, H., A.J. Shields, N. Jadbabaei, B. Pan, and R.P.S. Suri. 2014. Understanding and modeling removal of anionic organic contaminants (AOCs) by anion exchange resins. *Environ. Sci. Tech.* 48:13:7494-7502.



Shields, A.J. 2013. Understanding and modeling the sorption of anion exchange resins using poly-parameter linear free-energy relationships and phase conversion. Thesis. Temple University, Philadelphia, PA.

