

Related Project Experience

Jacobs has specialized in water system planning and design since it was founded in 1947. As a firm, we have built a reputation for not just meeting, but exceeding our clients' expectations. Our people, robust delivery tools, and thoughtful processes enable us to deliver the highest quality work. With over 900 employees in Southern California, Jacobs has provided project management, design, engineering, and construction services for municipal infrastructure projects with a capital value of approximately \$12 billion in combined revenue.

2021 ENGINEERING NEWS-RECORD

#1 Top 500 Design firms in the World

Our design projects consistently out-perform the industry by experiencing a much lower change order rate during construction. We stand by our clients to make sure they are fully satisfied with our work. Our firm continues to attract and retain the best employees in the business. One reflection of this is the longevity our team brings.

Our goal is to help you find the most cost-effective solutions, by balancing proven technologies with innovative solutions when their reliability can be demonstrated and confirmed.



As one of the largest providers of technical, professional, and construction services in the world, Jacobs offers a unique combination of established local experience and knowledge, and global resources and capabilities, to provide the Prescott Valley with technical services to achieve its drinking water reuse goals.

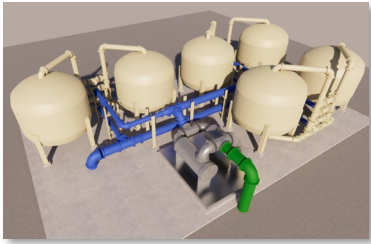
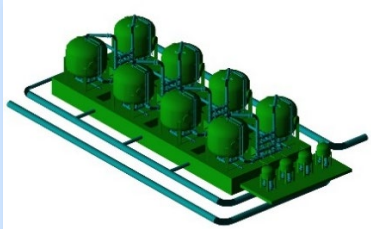
Jacobs has a solid reputation for delivering successful contaminated groundwater treatment projects for the full spectrum of constituents including arsenic, iron, manganese, nitrate, and emerging contaminants including PFAS.


We are an industry leader in the use of GAC, IX, and other adsorbent media in pressure vessel-based treatment systems. Our team has successfully delivered solutions to address PFAS for key federal, municipal, and private water clients across the U.S. and internationally. We are currently leading the OCWD PFAS Treatment Testing Support Services Study, and we were recently selected by OCWD for on-call engineering services to design well head treatment systems. We have executed fast-track PFAS design work for the City of Pico Rivera, U.S. Navy/Town of Coupeville, Washington, and the City of Woodbury, Minnesota. [Exhibit 1](#) shows our key PFAS projects, which emphasizes our ability to:


- Evaluate PFAS data and provide guidance and technical support
- Provide recommendations and system integration based on existing conditions
- Propose cost-effective improvements that can be reasonably be designed and constructed within a short timeframe

Exhibit 1. Key Projects

Project	Project Description
<p>Orange County Water District, CA PFAS Treatment Testing Support Services</p> <p>BUDGET \$728,619</p> <p>PROJECT TIMELINE Aug 2019 to present June 2021 – Final Report</p> <p>PROJECT TEAM Scott Grieco, Mike Hwang</p> <p>OCWD Pilot Skids</p>  <p>OCWD/Jacobs Project Team</p> 	<p>Jacobs has been working with OCWD since August 2019 on the nation's largest PFAS Pilot Program to test and evaluate the effectiveness of different types of media including eight GAC products, four IX resins, and two novel adsorbents for removing PFAS from Orange County's groundwater. We supported the design of OCWD's pilot system and served as the technical advisor during Phase 1 pilot operations. In parallel, we led the execution of RSSCT of GAC and novel adsorbents using well water from each of the impacted retail agencies/cities. The RSSCT included 12 rounds of testing using bulk samples from 12 different well locations. One of the RSSCT rounds tested the impact of VOCs as a co-contaminant and evaluate the effects of PFAS adsorption.</p> <p>Using results from the Phase 1 Pilot and RSSCT, our team developed unit cost estimates and a life-cycle analysis for the various treatment technologies for a representative 3,000 gpm system to support technology for full-scale treatment systems. Furthermore, our PFAS expert, Scott Grieco, advised OCWD on the specifications for pre-purchase of pressure vessels capable of accommodating GAC, IX, or other media such as FLUORO-SORB. In addition, our team participated in early discussions with DDW to establish PFAS operational monitoring requirements across lead-lag treatment systems that OCWD installed first in the City of Fullerton.</p> <p>Jacobs prepared a final report for OCWD published in June 2021. Following the completion of the final report, Jacobs has continued to provide technical advisory to OCWD's research group including recommending and confirming additional media products (IX and alternative adsorbents) for OCWD to evaluate as part of Phase 2 pilot testing, engineering evaluation of feasibility of full-scale use of FLUORO-SORB and performing lead-lag model projections included in every full-scale system OMMP for DDW approval.</p> <p>Project Challenges and Resolution: OCWD and its retail agencies are faced with addressing PFAS contamination across a large portion of their groundwater basin with variable water quality and geochemistry. To maximize the benefit of the RSSCT, we performed a water quality analysis of all the potentially affected wells and individually selected wells for RSSCT.</p> <p>Project Relevance:</p> <ul style="list-style-type: none"> ▪ Evaluated pilot study data, provided guidance and technical support ▪ First-hand understanding on media (GAC, IX, FLUORO-SORB) performance for removal of PFAS from groundwater based on the PFAS pilot testing and bench-scale testing ▪ Cost of water analysis
<p>City of Pico Rivera, CA PFAS Treatment Systems RSSCT Testing, Design and Services During Construction</p> <p>BUDGET \$1M (Design); \$12M (Const)</p> <p>PROJECT TIMELINE December 2020 to present</p> <p>PROJECT TEAM Cindy Yeager, Rich Nagel, Josh Kennedy, Scott Grieco, Mike Hwang, Gino Nguyen, Tom Paige, Joe Aguirre</p>	<p>The City of Pico Rivera currently utilizes eight wells for public water supply. Elevated PFAS levels at each of these wells coupled with current State Response Levels for PFOA and PFOS has prompted the City to evaluate options for PFAS treatment. Jacobs was retained for bench-scale testing, preliminary and detailed design of four PFAS treatment systems, bidding support and services during construction, and permitting support services. Jacobs also assisted with WRD funding application and discussions.</p> <p>The new PFAS treatment systems are envisioned to comprise adsorbent pressure vessels in a lead-lag train arrangement. A key decision that impacts the treatment system design is selecting the appropriate adsorbent media. Jacobs conducted RSSCT of four wells to evaluate adsorbent performance utilizing two granular activated carbon media, two ion exchange media and FS200 adsorbent media to develop a full-scale lead-lag model and costs for each water source. Jacobs designed three 4,500 gpm and one 1,500 gpm ion exchange PFAS treatment systems in parallel with RSSCT testing to meet an accelerated implementation schedule.</p>

Project	Project Description
	<p>Project Challenges and Resolution: To meet the schedule, RSSCT testing was performed concurrent with preliminary design activities. To expedite DDW approval for testing, meetings were conducted with DDW prior to submittal of the Work Plan.</p> <p>Project Relevance:</p> <ul style="list-style-type: none"> ▪ Evaluated PFAS pilot and bench testing data analysis, provided guidance and technical support ▪ Provided recommendations for integration with existing system and designed full-scale system based on recommendations ▪ Proposed cost-effective improvements that were designed within a short timeframe and are in the process of construction ▪ Hydraulics evaluation ▪ PFAS well head treatment selection analysis and design ▪ Fast-track design ▪ Similar size as City of Whittier full-scale treatment system
<p>Orange County Water District, CA PFAS Treatment System and Influent Conveyance Design for City of Tustin</p> <p>BUDGET \$948,904</p> <p>PROJECT TIMELINE Jan 2021 to present May 2022 - 90% Submittal</p> <p>PROJECT TEAM Carmen Quan, Scott Grieco, Mike Hwang, Gino Nguyen, Tom Paige, Adam Nichols</p> 	<p>As part of OCWD's PFAS On-Call Program for PFAS Treatment System Design, Jacobs is providing engineering design and engineering services during construction for the PFAS Treatment System and Influent Conveyance Design for the City of Tustin. This project includes a new centralized PFAS treatment system will be located at the existing Main Street Treatment Site and sized to treat up to 7,200 gpm from four offsite wells with four lead-lag IX trains. The project also includes 600 gpm of nitrate treatment, conversion from chlorine gas to liquid sodium hypochlorite, booster pump upgrade and over 2 miles of raw water conveyance.</p> <p>The 90 percent design was submitted in May 2022 and project is currently in 100 percent design phase.</p> <p>Project Challenges and Resolution: As part of 30-percent design, our team evaluated above ground and below ground approaches to header piping design. Based on Jacobs evaluation, the City ultimately decided the main headers to each pair of vessels should be located below the concrete slab. To allow easy accessibility to operations, trenches with covers will be part of the concrete slab design. System hydraulics from the 4 wells through the new treatment systems were also evaluated and confirmed during 30% design.</p> <p>Project Relevance:</p> <ul style="list-style-type: none"> ▪ Designed cost-effective improvements within a short timeframe ▪ Design scope includes incorporation of features needed to comply with DDW requirements. ▪ Treatment of blend of wells and incorporation into existing plant site ▪ Cost of water analysis ▪ Split procurement of lead-lag vessels and media.
<p>Orange County Water District, CA PFAS Treatment Systems for Golden State Water Company Bradford and Fairhaven Sites</p> <p>BUDGET \$818,324</p> <p>PROJECT TIMELINE June 2021 to Present April 2022 - Bid Documents</p> <p>PROJECT TEAM Carmen Quan, Scott Grieco, Mike Hwang, Gino Nguyen, Tom Paige</p>	<p>As part of OCWD's PFAS On-Call Program for PFAS Treatment System Design, Jacobs is providing engineering design and engineering services during construction for the PFAS Treatment Systems at GSWC's Bradford and Fairhaven Sites.</p> <p>The Bradford system will have a design capacity of 1,000 gpm while the Fairhaven system will have a design capacity of 1,800 gpm. Each system included design of two prefilters, one lead lag IX train and relocated sodium hypochlorite dosing.</p> <p>The 100% design was completed in April 2022 and currently the project is in the bid phase.</p> <p>Project Challenges and Resolution: GSWC staff were concerned with accessibility to pre-filters required during bag filter changeout. As part of 30% design, our team located the pre-filters in a shallow depressed pit with covers to allow operator access without a ladder to address the client concerns.</p>

Project	Project Description
<p>City of Woodbury, MN PFAS Treatment Master Planning and Emergency Treatment Projects</p> <p>BUDGET \$600K (Design), \$6M (Const.)</p> <p>PROJECT TIMELINE December 2019 to June 2020</p> <p>PROJECT TEAM Scott Grieco</p> 	<p>Project Relevance:</p> <ul style="list-style-type: none"> Designed cost-effective improvements within a short timeframe Design scope includes incorporation of features needed to comply with DDW requirements. Split procurement of lead-lag vessels and media <p>The City of Woodbury retained AE2S in partnership with Jacobs to fast-track design and commission a 4,500 gpm Emergency PFAS treatment facility by June 1, 2020. The centralized GAC facility treats 4 of the City's 19 wells using multiple lead-lag GAC trains. Detailed Design commenced in December 2019 and was constructed and fully operational by June 1, 2020. The Jacobs / AE2S team is currently developing a PDR for a permanent system to utilize all 19 wells for a combined 32 MGD PFAS treatment system.</p> <p>A stepwise testing plan of bench-scale media screening followed by pilot scale testing. The pilot system includes Fe/Mn pretreatment followed by GAC, IX, and Fluoro-Sorb media for PFAS. Results from testing, along with facility layouts and cost estimates will be used to provide final treatment selection to be carried into preliminary design.</p> <p>The project, which is on an accelerated schedule, has been streamlined by proactive, real-time communication with regulators to obtain plan review and approval.</p> <p>Project Challenges and Resolution:</p> <ul style="list-style-type: none"> Pre-purchased GAC vessels to shorten lead time and simplify process design Solicited a CMAR contractor at 50% design stage to gain constructability feedback before design completion Engaged city and state code and regulatory reviewers throughout the design to avoid major roadblocks Utilized pre-cast concrete panels and roof for building envelope to shorten construction time <p>Project Relevance:</p> <ul style="list-style-type: none"> Designed bench-scale and pilot study, provided guidance and technical support throughout testing PFAS well head treatment selection analysis and design Cost of water analysis Fast-track design Split procurement of lead-lag vessels and media
<p>U.S. Navy, Coupeville & Whidbey Island Communities, WA PFAS Groundwater Contamination Mitigation</p> <p>BUDGET \$1.1M (Design), \$7M (Const.)</p> <p>PROJECT TIMELINE October 2018 to May 2020</p> <p>PROJECT TEAM Scott Grieco, Josh Kennedy</p>	<p>Jacobs collaborated with the U.S. Navy, the town of Coupeville, and other Whidbey Island, Washington communities to characterize, mitigate, and address PFAS groundwater contamination impacts on numerous public and private drinking water supply wells. We proactively addressed PFAS contamination impacting the town's primary municipal drinking water supply well through fast- tracked design and installation of a 500 gpm GAC system expandable to 750 gpm comprising two parallel lead-lag pressure vessel trains at the town's pre-existing treatment plant. The newly installed GAC pressure vessels include provisions to support potential use of ion-exchange and have been operating since July 2019, successfully reducing PFAS concentrations to non-detect levels in the treated water.</p> <p>Project Challenges and Resolution:</p> <ul style="list-style-type: none"> Determining the optimal and most effective treatment process accomplished by performing a comparative life-cycle cost evaluation of GAC, IX and membrane/RO treatment approaches. GAC was selected, however design incorporated features to support future IX media if desired in the future

Project	Project Description
	<ul style="list-style-type: none"> Hydraulics and potential loss of pumping/supply capacity due to additional GAC losses. The team prepared the hydraulic system evaluation and assessed remaining useful life of the existing pumps Developed plan to maintain the existing plant operations while constructing the new system Project completion was under a Time-Critical Removal Action. To meet the deadline, the construction was fast-tracked based on the 90-percent design documents <p>Project Relevance:</p> <ul style="list-style-type: none"> PFAS well head treatment selection analysis and design Fast-track design Split procurement of lead-lag vessels and media

Why Jacobs

- I. Leadership who are committed and experienced in PFAS pilot studies will be your technical advisors throughout the project.
- II. Experienced team with a history of delivering reliable, operator friendly, efficient, cost-effective PFAS treatment system designs.
- III. A team that understands your focus on operations, maintenance, reliability, and quality.
- IV. Tools, resources and a focus on quality and safety from ENR's #1 ranked design firm.

Every solution we propose has been implemented on Jacobs projects by our proposed team members who will bring their experience solving similar issues to your project. Leveraging this experience, we are confident we can meet your critical delivery schedule.

Exhibit 2 provides a summary of key PFAS treatment projects for both drinking water and reuse applications.

Extensive PFAS Media Experience

Prescott Valley will benefit from Jacobs' extensive hands-on experience with various PFAS treatment media from multiple manufacturers. We have designed and commissioned systems with several different IX manufacturers' resins. Various GACs, and Jacobs has completed permitting for the **first full-scale** drinking water PFAS application for **CETCO Fluoro-sorb® FS200 in the US** and is currently completing design/installation of a system in the eastern US.

Exhibit 2. Relevant Experience – Representative Groundwater & Reuse Focused PFAS Projects

Project	Client	Location	Date Completed or Project Status	Components									
				Investigation/Sampling	Community Involvement	Vulnerability Assessment / Management Plan	Alternatives Evaluation	Treatability Testing	Pilot-Scale Testing	Conceptual Design	Cost Estimating	Preliminary / Detailed Design	Construction Phase Services
Drinking Water and Reuse	Clayton County Water Authority	Georgia	Ongoing	X			X	X		X	X		
Drinking Water Treatment	US DOD	Confidential	Ongoing	X			X			X	X	X	
Drinking Water Treatment	US Navy	Virginia	Ongoing	X			X	X		X	X	X	
Drinking Water Treatment	US Navy	Washington	May 2020	X	X		X	X		X	X	X	X
Drinking Water Treatment	City of Woodbury	Minnesota	June 2020	X		X	X	X	X	X	X	X	X
Drinking Water Treatment	City of Woodbury	Minnesota	Ongoing	X			X	X	X	X	X	X	
Drinking Water Treatment	US ACOE	Confidential	May 2020								X	X	X
Drinking Water Treatment	Orange County Water District	California	June 2021					X	X	X	X		
Drinking Water Treatment	City of Tustin	California	Design - 100%								X	X	X
Drinking Water Treatment	Golden State Water	California	Construction Phase (Expected Q3 2023)								X	X	X
Drinking Water Treatment	Alameda County Water District	California	Design - 30%				X	X		X	X	X	X
Drinking Water Treatment	City of Verona	New Jersey	Ongoing	X			X	X		X	X	X	X
Drinking Water Treatment	NJAW	New Jersey	Ongoing Start-up expected 1/2023										
Drinking Water Treatment	NJAW	New Jersey	May 2022	X			X	X			X		
Drinking Water Treatment	Cal Water	California	Ongoing				X				X		
Drinking Water Treatment	Zone 7 Water District	California	December 2020			X							
Drinking Water Treatment	Greene County	Ohio	March 2020	X		X							
Drinking Water Treatment	Ann Arundel County	Maryland	December 2020	X		X							
Drinking Water Treatment	City of Pico Rivera	California	Construction Phase (Expected Q2 2023)				X	X		X	X	X	X
Drinking Water Treatment	Water Replenishment District	California	Ongoing									X	X
Drinking Water Treatment	City of Whittier	California	Ongoing				X		X	X	X	X	
Drinking Water Treatment	Decatur Utilities	Alabama	Ongoing				X	X	X	X	X		
Drinking Water Treatment	City of North Bay	Ontario, CA	Ongoing				X	X		X	X		
Non-potable recharge	IRWD	California	Completed 2020				X	X		X	X		
Wastewater Reuse	Santa Margarita	California	Completed 2021				X	X					
Wastewater Reuse	City of Aurora	Colorado	Ongoing				X	X	X	X	X		

Scott Grieco, PhD, PE

EDUCATION

Ph.D., Bioprocess
Engineering, State
University of New York
College of Environmental
Science & Forestry

M.S., Environmental
Engineering, Syracuse
University

B.S., Chemical Engineering,
State University of New
York at Buffalo,

ACTIVE REGISTRATIONS

Professional Engineer,
New York, #073554

PROFESSIONAL MEMBERSHIPS

AWWA

National Council of
Examiners for Engineering
and Surveying (NCEES)

YEARS OF EXPERIENCE

31

OFFICE LOCATION

Syracuse, NY

Dr. Grieco has over 31 years of experience in the evaluation, design, and optimization of water and wastewater treatment systems. Dr. Grieco is a recognized expert in physical/chemical treatment technologies. He has lead projects for drinking water, groundwater remediation, industrial water, and leachate treatment for public and private market sectors, including public utilities, private water companies, chemical manufacturing, metals, aerospace, pharmaceuticals, US Department of Defense, Department of Energy, and Army Corp of Engineers.

Working with multi-disciplinary teams of engineers and scientists, Dr. Grieco interacts with senior technologists and management, and works directly with client senior leadership in assessing technical solutions, minimizing projected life-cycle costs, and reducing environmental liabilities. Prior to joining Jacobs-CH2M, Dr. Grieco directed activities for a private technology development and treatability testing laboratory. Under his direction, bench- and pilot-scale technology development programs were completed for precipitation, adsorption, biological treatment, advanced oxidation, and electro-coagulation.

RELEVANT PROJECT EXPERIENCE

Ground Water/Surface Water

PFAS & Emerging Contaminants

Project Technical Director, Alameda County Water District, Dec 2021 – Present. Conducting rapid small-scale column tests (RSSCTs). Evaluated GAC, IX, and alternative surface-modified clay. Evaluating bench scale data to develop full-scale lead-lag model and costs for each water source. Project will incorporate a detailed design of 15 MGD for PFAS treatment, with future provisions of an additional to 22 MGD of membrane softening.

Project Technical Director, City of Pico Rivera, Dec 2020 – Present. Conducting rapid small-scale column tests (RSSCTs) four well water sources. Evaluating GAC, IX, and alternative surface-modified clay. Evaluating bench scale data to develop full-scale lead-lag model and costs for each water source. Providing technical input and review to design team regarding full-scale process design for 15 MGD of treatment.

Project Technical Director, City of Tustin, June 2021 – June 2022. Developed Treatment systems for Nitrate removal and PFAS removal using Ion Exchange technology. Systems designed for 6 MGD

total flow. Provided review and input on system designs.

Sr Technologist / Subject Matter Expert, North Jersey District Water Supply Commission, Feb 202 – Present.

Developed treatment basis of design, alternatives analysis, and 10% design for treatment of 1,4-Dioxane in surface water drinking water supply. Evaluated Several Advanced Oxidation Processes and Synthetic Resin Adsorption for removal. Developed Design around UV/hydrogen peroxide treatment system to treat 1,500 µg/L to <0.33 µg/L.

Subject Mater Expert/Lead Technical Reviewer, Zone 7, California, April 2020 – Dec 2020.

Developed area wide evaluation of PFAS presence using available data. Conducted risk profile and potential source identification through GIS integration of available environmental databases. Identified potential sources, estimated risk to migration to drinking water, and additional areas to investigate.

Provided equipment selection, layout, and cost estimates (both capex and opex).

Subject Mater Expert/Lead Technical Reviewer, Ann Arundel County, MD, Nov 2019 – Jun 2020. Developed area wide evaluation of PFAS presence using available data. Conducted risk profile and

potential source identification through GIS integration of available environmental databases. Identified potential sources, estimated risk to migration to drinking water, and additional areas to investigate.

Project Technical Director, Irvine Ranch Water District, April 2020 – October 2020.

Conducted rapid small-scale column tests (RSSCTs) on non-potable recharge wells. Focused on removal of PFAS and VOCs. Evaluated various GACs and alternative surface-modified clay. Evaluating bench scale data to develop full-scale lead-lag model and costs.

Subject Matter Expert/Technical Reviewer. Great Lakes Water Authority (GLWA), Oct 2020 – Feb 2021. Developed design and specification for temporary treatment system for PFAS to capture contaminated construction water related to replacement of large water main through a former landfill area.

Subject Matter Expert; EPA Region V, Jan 2020 – April 2021. Provided technical review of project reports and work plans related to remediation site with several operable units with PFAS, 1,4-Dioxane and solvent-based organics. Included additional groundwater investigation, recommendations for existing treatment systems, and recommendations for potentially requiring additional treatment related to impacts to adjacent potable water supplies.

Project Technical Director, New Jersey American Water, March 2021 – May 2022.

Conducted bench-scale rapid small scale column tests (RSSCT) PFAS, VOCs, and radionuclides with 2 GACs, 2 IX, and 1 surface-modified clay. Data being used to select adsorbents for full-scale system operations. Provided relative cost comparisons for capital and operating expenses. Responsible for material selection, workplan development, and review final report.

Project Technical Director, New Jersey American Water, March 2021 – Current.

Based on bench-scale RSSCT testing for Fluoro-Sorb, client decided to proceed with Full-scale demonstration. Designed 1000 gpm system to be placed downstream of existing iron/manganese treatment. Project included fast-track design and procurement. Vessels were selected to fit in existing building with minimal modification to expedite installation. Obtained temporary full-scale permit from State Agency to allow wells to come back on line, as they were shut down due to elevated PFOA.

Project Technical Director, New Jersey American Water, Oct 2019 – Sept 2020.

Conducted bench-scale equilibrium and kinetic testing to treat PFAS, MTBE, and VOCs with 5 carbon products and one novel surface-modified clay. Data used to select adsorbents for full-scale pilot on site. Provided technical oversight for laboratory bench-scale efforts and on-site pilot. Responsible for material selection, workplan development, and final report.

Project Technical Director, OCWD, Sept 2019 – August 2021. Conducted rapid small scale column tests (RSSCTs) for 12 water suppliers. Evaluated 7 carbon products and one novel surface-modified naturally mined material. Provided technical oversight for on-site pilot using GAC, IX, and novel products. Evaluated bench and pilot scale data to develop model and costs for each water user. Responsible for material selection, workplan development, and final report.

Senior Technologist, Woodbury, MN Groundwater Treatment System Design, June 2019 – Present. Technical evaluation and design of new rapidly-implemented GAC treatment system for 4500 gpm wellhead treatment for PFAS. Lead Technical Reviewer for PFAS System. Feed system contained various wells with external and internal bypass for treatment. Developed calculations to demonstrate compliance with treatment objectives for various operating scenarios.

Developing alternatives for Preliminary Engineering Report for 32 MGD permanent system. System incorporates alternatives for iron/manganese removal, PFAS removal, and softening. Both gravity and pressurized equipment design were considered. Process design being supported by on-site piloting for iron/manganese high-rate filters and PFAS treatment (GAC and IX).

Senior Technologist, Melbourne Airport, Feb 2018 – Present. Design of GAC-based water treatment system for removing PFAS from site construction waters. Evaluated several alternatives before selecting adsorbent-based treatment system design. Reviewed construction bids prior to award.

Senior Technologist, Picatinny Arsenal, PFAS Treatment, 2019. Design of GAC-based water treatment system for removing PFAS from groundwater. Developed bid specification and full design. Reviewed design prior to bid and construction.

Senior Technologist, R&D Project, Dec 2018 – Present. Evaluating various adsorbent materials for PFAS treatment in co-contaminated groundwater. Materials include GAC, IX, and alternative surface-modified material. Evaluating at pilot scale under large-scale design parameters.

Senior Technologist, US Navy NW Annex Groundwater Treatment Design, Jan 2019 – April 2022. Technical evaluation and design of treatment system fuel oxygenate and PFAS co-contaminated GW. Developed equipment sizing and treatment performance modeling projections. Conducted RSSCT testing for PFAS and MTBE removal using GAC.

Lead Technical Reviewer; US Navy Whidbey Island, WA; Dec 2018 – Present. Provided rapid small-scale column testing (RSSCT) protocol development and results report review. Comparative testing of bituminous coal-based activated carbon products with various physical/chemical properties.

Fentress Naval Auxiliary Landing Field, Chesapeake, VA – Lead Technical Reviewer for Engineering Evaluation/Cost Estimate for PFAS potable water treatment system (ground water source). System design basis was developed based on sampling of on-site off-site monitoring wells. Provided review of technical considerations of treatment system alternatives which included granular activated carbon, anion exchange resin, and reverse osmosis.

Lead Technical Reviewer, US Navy Whidbey Island, WA. PFAS potable water treatment system (ground water source). Project assessed on site and off site well data to develop projected basis of design for PFAS concentrations. Flow data was developed based on user demand. Considered granular activated carbon, anion exchange, and reverse osmosis treatment systems. Alternative evaluation report included technical considerations and conceptual level costs for comparison of alternatives. The report was prepared for State and Federal regulatory review. Discussed review comments with regulators and prepared responses to address concerns.

Provided rapid small-scale column testing (RSSCT) protocol development and results report review. Comparative testing of bituminous coal-based activated carbon products with various physical/chemical properties. Lead Technologist for design and start-up of 700 gpm full scale system. Lead Technical Reviewer for PFAS System design and Start-up documents.

Subject Matter Expert; US Navy Oceana Naval Station; Oct 2018 – July 2019. Evaluated advanced PFAS chemical destruction technology for treatment of groundwater. Program is currently in bench-scale assessment and will develop design parameters to move to field pilot as future phase.

Wastewater / Biosolids/Compost

[PFAS](#)

Senior Technologist, Santa Margarita Wastewater Authority, March 2021 – present. Develop testing plan and provided oversight of RSSCT testing using GAC, IX, and Fluoro-Sorb on tertiary treated effluent. Evaluated systems with and without final chlorination. Develop final report providing recommendations for field-pilot implementation.

PEER REVIEWED PUBLICATIONS

Grieco, S. A., et. al. **Ex situ treatment and residual management of PFAS contaminated environmental media.** Remediation Journal, 32(1-2), 55-63, 2022.

Grieco, S.A., et. al. **Comparing conventional and emerging adsorbents for per- and polyfluoroalkyl substances: Kinetic, equilibrium, and column experiments,** AWWA Water Science 3(6), e1256, 2021.

Mohr, T. K., DiGuseppi, W. H., Hatton, J. W., & Anderson, J. K., **Environmental investigation and remediation: 1, 4-dioxane and other solvent stabilizers.** CRC Press. Contributor to **Chapter 8: Treatment Technologies.**

Grieco, S.A., Singer, D.C. and Bement, G.R., **Evaluating Effectiveness and Permanence of Selenium Treatment in a Solid Matrix via Aqueous-Mediated Zero Valent Iron Reaction,** Journal of Environmental Protection, (8) 990-1001, 2017.

Grieco, S.A., Ramarao, B.V., Schulte, J. and Kiemle, D., **Adsorption equilibrium and mechanisms of tris (2-chloroethyl) phosphate (TCEP) on zeolite- β under environmentally relevant and competitive conditions with methyl tert-butyl ether (MTBE).** Environmental Technology & Innovation, July 2017.

Crawford, D.M., Doerner, J., Flederbach, W., Grieco, S.A., Keegan, J.J., LaManche, J.J., and Wike, W., **“Physical/Chemical Technologies”** in *Innovative Engineering Technologies for Hazardous Waste Remediation*, R. Bellandi (ed.), Van Nostrand Reinhold Company, 1995.

PRESENTATIONS/PUBLICATIONS

Grieco, S.A., et. al., **A Comprehensive Comparative Assessment of Conventional and Emerging Adsorbents for Treatment of Low Level PFAS in Drinking Water,** AWWA Water Quality and Technical Conference, Tacoma, Washington, November 2021.

Scott Grieco, Implementing **Granular Activated Carbon Systems: Important Design and Start-Up Considerations,** Guest Column: Water On-Line, July 6, 2021.

<https://www.wateronline.com/doc/implementing-granular-activated-carbon-systems-important-design-and-start-up-considerations-0001>

Water Environment Workshop: Pathogens and Microconstituents, **“PFAS in our Water Cycle”**, WEFTEC 2021, Chicago, Illinois, October 2021.

PFAS 101: Introduction to the Forever Chemical, **“A focus on Wastewater & Biosolids”**, WEFTEC 2021, Chicago, Illinois, October 2021.

Invited Panelist, Orange County Water Summit, October 2021, **“PFAS – Where are we now?”**, Anaheim, California, October, 15, 2021.

Scott Grieco and James Hatton, **“PFAS Ex-Situ Water Treatment”**. Enviro Wiki: [https://www.enviro.wiki/index.php?title=PFAS Ex Situ Water Treatment](https://www.enviro.wiki/index.php?title=PFAS_Ex_Situ_Water_Treatment), Updated May 2021.

Grieco, S.A., Central States Annual Government Affairs Seminar, **“PFAS in Wastewater”**, Fond du Lac, Wisconsin, Feb 20, 2020.

Grieco, S.A., California WaterReuse Workshop, Invited Speaker, **“PFAS in Wastewater and Reuse”**, Los Angeles and San Francisco, California, Jan 15 and 22, 2020.

Grieco S.A., Marquette University Short Course on Emerging Contaminants – Invited Lecturer, **“PFAS Treatment and**

Costs", Milwaukee, Wisconsin, October 2019.

Grieco, S.A, CRC Care, **PFAS Impacts on Solids Waste Landfills**", 8th Annual International Clean-Up Conference, Adelaide, South Australia, Australia, Sept 2019.

Grieco, S.A., Environmental Research and Education Foundation (EREF), **"PFAS Impacts on Landfills"**, PFAS Symposium, Ypsilanti, MI, August 2019.

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