



ATTACHMENT I – General Qualifications
ANNUAL REQUEST FOR QUALIFICATIONS AND EXPERIENCE NO:
ADSP015-00004729

STATE PROCUREMENT OFFICE
Department of Administration
100 North 15th Avenue, Suite 201
Phoenix, Arizona 85007

(If a firm has branch offices, complete for each specific branch office seeking work.)

1. Annual Request for Qualifications

a. FIRM (OR BRANCH OFFICE) NAME:	Hazen and Sawyer, P.C.
b. FIRM (OR BRANCH OFFICE) STREET:	1400 E. Southern Avenue, Suite 650
c. FIRM (OR BRANCH OFFICE) CITY:	Tempe
d. FIRM (OR BRANCH OFFICE) STATE:	AZ
e. FIRM (OR BRANCH OFFICE) ZIP CODE:	85282

f. YEAR ESTABLISHED:	1951
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(g1). OWNERSHIP - TYPE:	Professional Corporation
(g2) OWNERSHIP - SMALL BUSINESS STATUS:	

h. POINT OF CONTACT NAME AND TITLE:	Curtis D. Courter, P.E., Senior Associate
i. POINT OF CONTACT TELEPHONE NUMBER:	480-436-7959
j. POINT OF CONTACT E-MAIL ADDRESS:	ccourter@hazenandsawyer.com

k. NAME OF FIRM (If block 1a is a branch office):	
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2. EMPLOYEES BY DISCIPLINE

a. Discipline Title	b. Function: Primary (P) or Secondary (S)	c. No. of Employees - Firm	d. No. of Employees - Branch
Architect	P	8	0
CADD Technician	P	57	1
Chemical Engineer	P	19	2
Civil Engineer	P	62	2
Construction Inspector	P	42	0
Construction Manager	P	22	0
Cost Engineer/Estimator	P	11	0
Electrical Engineer	P	33	0
Environmental Engineer	P	272	0
Environmental Scientist	P	16	0
Hydraulic Engineer	P	0	0
Mechanical Engineer	P	25	0
Project Manager	P	0	0
Sanitary Engineer	P	0	0
Structural Engineer	P	22	0
Technician/Analyst	P	26	0
Water Resources Engineer	P	14	0
Other	P	5	0
Other (Administrative)	P	94	0
Other (Economists)	P	4	0
Other (O&M Specialists)	P	8	0
Total		740	5



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3. PROFILE OF FIRM'S EXPERIENCE AND ANNUAL AVERAGE REVENUE FOR LAST YEAR

a. Approximate No. of Projects	b. Experience	c. Revenue Index Number (see below)
21	Solid Wastes	1
39	Industrial Waste Treatment	2
39	Surveying; Platting; Mapping	2
39	Testing and Inspection Services	2
39	Cost Estimating	2
39	Energy Conservation	2
39	Heating; Ventilating; Air Conditioning	2
39	Master Planning (Planning (Community))	2
39	Master Planning (Planning (Site))	2
39	Water Resources	2
59	Electrical Studies and Design	3
59	Environmental Impact Studies, Assessments or Statements	3
59	Cost Estimating; Cost Engineering and Analysis; Parametric Costing; Forecasting (Financial/Rate Studies)	3
59	Sustainable Design	3
80	Dams (Earth; Rock)	4
80	Design-Build	4
80	Plumbing and Piping Design	4
99	Storm Water Handling and Facilities	8
118	Construction Management	8
138	Water Supply	9
197	Sewage Collection, Treatment and Disposal	10

PROFESSIONAL SERVICES REVENUE INDEX NUMBER

- | | |
|---|---|
| 1. Less than \$100,000 | 6. \$2 million to less than \$5 million |
| 2. \$100,000 to less than \$250,000 | 7. \$5 million to less than \$10 million |
| 3. \$250,000 to less than \$500,000 | 8. \$10 million to less than \$25 million |
| 4. \$500,000 to less than \$1 million | 9. \$25 million to less than \$50 million |
| 5. \$1 million to less than \$2 million | 10. \$50 million or greater |



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME		b. ROLE IN THIS CONTRACT		c. YEARS EXPERIENCE	
Kevin Alexander, PE		Project Director / Technical Lead		1. TOTAL 19.5	2. WITH CURRENT FIRM 1 Year and 1 Month
d. LOCATION (City and State) San Diego, CA					
e. EDUCATION (DEGREE AND SPECIALIZATION)			f. PROFESSIONAL TRAINING - REGISTRATIONS		
BS Civil Engineering, University of Missouri Rolla			Professional Engineer: Arizona, California, Florida, Idaho, Oklahoma, Texas, Washington, NCEES		
g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)					
Professional Activities American Water Works Association AZWA American Membrane Technology Association CA-NV CA Water Reuse Association Water Environment Federation					

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Newland Communities, Goodyear, Arizona	2013-2014	2016(Estimated)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Water Treatment Feasibility Study including analysis of Activated Alumina treatment and Reverse Osmosis. Treatment was required for fluoride, arsenic and nitrate in a local groundwater. Project included sizing, layouts, and estimating costs for each treatment process estimated at \$25Million to \$30Million. The Phase 1 study was completed for \$35,000 in 2014. A second \$20,000 phase negation phase is currently underway, while the developer finalizes agreements with the City of Goodyear. Design is anticipated to proceed in 2015.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	West Basin Desalination Plant Decommissioning Project, Redondo Beach, CA	2014	2015 (estimated)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Developed plans and specifications for the demolition of a seawater desalination demonstration plant at the SeaLab in Redondo Beach, CA. Project is estimated at \$1.3M for removing equipment and cleaning up the site for future uses. Engineering contract value is for \$125,000	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	Loudon Water, Fairfax, Virginia	Project is Ongoing	2018-2020 Estimated
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Providing business masterplanning and design services for an 11 MGD expansion of an existing 11 MGD biological nutrient removal facility known as the Broadrun Water Reclamation Plant. Tasks include evaluation of existing MBR membrane condition to determine best practices for saving money on current operations as well as planning for the 11 MGD Expansion. Design services will begin after the development of the business plan.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	Texas Water Development Board, Water Reuse Guidance Document Development, Austin, Texas	2014	N/A
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Assisted with development of a Water Reuse planning document for Direct Potable Reuse in Texas. The document is to help regulators, water agencies and engineers with planning and implementing Direct Potable Reuse Projects. The role includes assistance with development of treatment technology and overall treatment trains for DPR. In addition provided development of pilot testing plans and protocols for guiding DPR projects to the right technology selection.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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(1) TITLE AND LOCATION <i>(City and State)</i>	(2) YEAR COMPLETED	
Coachella Valley Water District, Chrome 6 Treatment Study, Palm Desert, California	Professional Services 2014(Ongoing)	Construction (if applicable) 2015-2018 estimated
5. (3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE The Coachella Valley Water District is planning to implement a \$300M project to add treatment for Chrome 6 based on the new California regulation of 10 PPB. The study included evaluation of multiple treatment alternatives including oxidation/filtration, ion exchange and surface water importation and treatment. The study is also looking at concentrate treatment alternatives, brine recovery and recharge and recovery to allow for maximum benefit of groundwater and surface water. The study is to be completed in early 2015, and the project will move to design and CMAR projects to implement the new treatment systems.	<input checked="" type="checkbox"/> Check if project performed with current firm	



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Curtis D. Courter, P.E.	b. ROLE IN THIS CONTRACT Project Manager / Technical Lead	c. YEARS EXPERIENCE	
		1. TOTAL 18	2. WITH CURRENT FIRM 18
d. LOCATION (City and State) Tempe, AZ			
e. EDUCATION (DEGREE AND SPECIALIZATION) MBA Business Administration, University of Michigan Dearborn MS Civil Engineering, Wayne State University BS Civil Engineering, Wayne State University		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: Arizona, Ohio, Kentucky, Michigan, Pennsylvania	

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Mr. Courter is a Senior Associate with over 17 years of experience in planning, design and construction of numerous water, wastewater and stormwater projects. As a Program Manager and Project Manager on numerous assignments, Mr. Courter has provided overall program and project management direction, including development of program management plan documents, direction of program management teams and subconsultants, coordination of task level activities, direction of multiple design and construction contracts, client interface and coordination, community involvement programs, quality control reviews, and specific technical direction for program and project design and construction contracts. He has a strong track record in developing and managing schedules, budgets, document control systems, contract procurement activities, as well as program and project management progress reporting.

Professional Activities

AZ Water Association
 American Water Works Association
 Water Environment Federation – Disinfection Committee

H. RELEVANT PROJECTS

1.	(1) TITLE AND LOCATION (City and State) Estrella Mountain Ranch Southern Solutions Water Supply Project, Goodyear, AZ	(2) YEAR COMPLETED: 2014	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE During Phase 1, Mr. Courter served as the Project Engineer for master planning and preliminary design of a new 2 MGD RO treatment plant, transmission pipelines, raw water wells and concentrate evaporation ponds. As the Project Manager for Phase 2, Mr. Courter will lead the design of the RO WTP and related work. The estimated construction cost of the new RO treatment plant and ancillary facilities is \$27.8 million.	Professional Services 2014	Construction (if applicable) 2016 (Projected)
		<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	(1) TITLE AND LOCATION (City and State) Rolling Mills Regulator Improvements, Fort Wayne, IN	(2) YEAR COMPLETED	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Mr. Courter is the Project Manager and Lead Designer providing design and construction administration services for the replacement of a Brown and Brown regulator and structurally deficient outfall with a new bending weir chamber and outfall. The new chamber will increase flow to the interceptor and reduce overflows from 18 per year to less than 4 per year. The chamber has an underflow baffle to skim floatables prior to overflowing. The project also includes installation of three permanent ADS flow meters, as well as associated electrical, instrumentation, controls and communication equipment. The estimated cost of this 20 mgd facility is \$540,000.	Professional Services 2015 (Projected)	Construction (if applicable) 2015 (Projected)
		<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	(1) TITLE AND LOCATION (City and State) Nashua Screening and Disinfection Facility, Nashua, NH	(2) YEAR COMPLETED	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Mr. Courter was the Tech Advisor and disinfection Design Lead for a 90 MGD screening and disinfection facility. This \$10 million disinfection facility includes fine screens, vacuum feeders for chlorination and dechlorination and a combination of flushing gates and tipping buckets for automated cleaning. The contact tank is below ground and was designed to utilize a combination of cast-in-place and precast concrete to reduce costs. Construction is substantially complete.	Professional Services 2015	Construction (if applicable) 2015
		<input checked="" type="checkbox"/>	Check if project performed with current firm



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4.	(1) TITLE AND LOCATION (<i>City and State</i>)	(2) YEAR COMPLETED	
	North Olmsted Collection System Improvements, North Olmsted, OH	Professional Services 2014	Construction (if applicable) 2014
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
<p>Mr. Courter was the project manager for the evaluation, design and construction administration of collection system improvements to increase conveyance capacity within the LeBern and Dover sewersheds. The project included evaluation of existing information, including GIS, CCTV, pump records, SCADA data, sewer drawings, etc. in order to develop an improvement plan. The condition assessment, modeling and engineering evaluation identified required improvements including 7,000 feet new sewer lines ranging in size from 12-inch to 24-inch, construction of nearly 2 million gallons of below grade equalization storage and upgrades to three sanitary lift stations. The work was completed in two phases through 3 separate construction contracts and is fully operational. The construction was completed under budget and on time and the total construction cost for the three projects was \$10,362,883.</p>			
5.	(1) TITLE AND LOCATION (<i>City and State</i>)	(2) YEAR COMPLETED	
	West Park EQ Facility, Metropolitan Government of Nashville and Davidson County, Nashville, TN	Professional Services 2017	Construction (if applicable) 2017
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
<p>Mr. Courter was the Technical Advisor and performed QA/QC for construction of a 22 MG pre-stressed concrete storage tank and upgrading an existing influent pump station from 30 mgd to 45 mgd. The project included site design for the partially buried tank to fit into an existing park, park amenities including a new recreation field and playground, and incorporation of cost effective sustainability elements into the design. This project will be bid at the beginning of 2015. The estimated cost is \$19.8 million, including just over \$2 million in park improvements. Design is complete and construction is scheduled to be complete in 2017.</p>			



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4. Resumes of Key Personnel Proposed for this Contract *(Complete one Section 4 for each key person.)*

a. NAME Doug Kobrick, PE	b. ROLE IN THIS CONTRACT Project Manager / Technical Lead	c. YEARS EXPERIENCE	
		1. TOTAL 34	2. WITH CURRENT FIRM 1
d. LOCATION <i>(City and State)</i> Tempe, AZ			
e. EDUCATION <i>(DEGREE AND SPECIALIZATION)</i> MS Civil/Environmental Engineering, Arizona State University BS Civil Engineering, Brown University		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: Arizona	

g. OTHER PROFESSIONAL QUALIFICATIONS *(Organizations, Awards, etc.)*

Professional Activities

AZ Water Association
 Chair of the Wastewater Treatment Committee
 Member of the Conference Program Committee
 American Water Works Association
 Long-term member, Water Conservation Division
 Water Environment Federation
 American Public Works Association

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION <i>(City and State)</i>	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Yavapai-Apache Nation; I-17 Corridor Wastewater and Water Improvements Camp Verde, AZ	2014	2014
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Design and construction support services for two wastewater pump stations, 1 mi dual 8-in diameter force mains, 2 mi 10-in gravity sewer. Project also included 3000 l.. water main extension. Engineering Fee: \$360 K, Total Project: \$3.6 M.	<input type="checkbox"/> Check if project performed with current firm	
2.	Island WWTP Effluent Filtration Replacement Lake Havasu City, AZ	2014	2014
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Design and construction support services for 5 mgd (peak capacity) cloth media filter for reclaimed water tertiary treatment. Engineering Fee: \$50 K, Total Project: \$500 K.	<input type="checkbox"/> Check if project performed with current firm	
3.	Zone 27 Water Improvements Prescott, AZ	2012 (before my involvement)	2015 (underway, nearing completion)
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Construction phase services and design revisions for 1.25 MG prestressed concrete reservoir, 5 mgd booster pump station, water pipelines. Engineering Fee: \$400 K, Total Project: Approximately \$5 M.	<input type="checkbox"/> Check if project performed with current firm	
4.	(1) TITLE AND LOCATION <i>(City and State)</i>	(2) YEAR COMPLETED	
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE	Professional Services	Construction (if applicable)
5.	(1) TITLE AND LOCATION <i>(City and State)</i>	(2) YEAR COMPLETED	
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE	Professional Services	Construction (if applicable)



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a. NAME Jacqueline K. Rhoades, PE	b. ROLE IN THIS CONTRACT Project Manager / Project Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 7	2. WITH CURRENT FIRM 1
d. LOCATION (City and State) Tempe, AZ			
e. EDUCATION (DEGREE AND SPECIALIZATION) MS Environmental Engineering, University of Arizona BS Chemical Engineering, University of Arizona		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer (Civil): Arizona, 52758 Water Treatment Plant Operator (Grade 2), Arizona OP032499	

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Honors and Awards

Young Professional (YP) of the Year | AZ Water Association | 2013
 Select Society of Sanitary Sludge Shovelers (5S) | AZ Water Association | 2013
 Busch Prize Nominee | ARCADIS | 2012
 Quentin Mees Research Award | AZ Water Association | 2011 | Using Chlorine Dioxide to Reduce TTHM Formation: A Full- Scale Evaluation

Professional Activities

AZ Water Association Secretary, Board of Directors, Committee Member, Committee Chair
 Water Research Foundation PAC Member
 American Water Works Association cVOC Regulatory Affairs Office Advisory Work Group Water Environment Association
 Engineers without Borders
 Water for People

Selected Publications

Eaton, A., Chowdhury, Z., Shaw, J., Roberson, J. A., "The State of the Science of Analytical Methods for cVOCs" Journal AWWA, Vol. 104 Iss. 11, 2012, Page Range E572- E581, 10 Pages.
 Shaw, J., Passantino, L., Chowdhury, Z., Hayes, T., Kindred, M., "Using Chlorine Dioxide to Reduce Distribution System THM Formation: Costs, Benefits, and Operational Implications" Proceedings, Annual Conference and Exposition, American Water Works Association (AWWA), Chicago IL, July 23, 2010.
 Shaw, J.K., Cotton-Leto, C.A., Chowdhury, Z.K., Archibald, E., "Planning for Compliance: An Evaluation of Water Quality Conditions that Could Trigger the Need for Treatment Changes," Proceedings, Water Quality Technology Conference (WQTC) and Exposition, American Water Works Association (AWWA), Seattle WA, November 15- 19, 2009.
 Shaw, J.K., Pepe, L.K., Ela, W., Saez, E., "Damage Control: Managing the Residuals Generated During Arsenic Treatment," Proceedings, 2008 Water Quality Technology Conference and Exposition, American Water Works Association, Cincinnati OH, November 16-20, 2008.
 Shaw, J., Fathordobadi, S., Zelinski, B., Ela, W., Saez, A., "Stabilization of arsenic-bearing solid residuals in polymeric matrices" Journal of Hazardous Materials, 152:3:1115, April 15, 2008

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services Ongoing	Construction (if applicable)
1.	Coachella Valley Water District Source of Supply Study (Palm Desert, CA)		
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Project engineer and task leader evaluating options in a \$850,178 study to a balanced water resource portfolio including groundwater with chromium 6 treatment, use of Colorado River water, and a decentralized approach (POU/POE). The evaluation is on-going and includes treatment process selection and plant siting, conceptual design, and cost estimating for treatment of over forty 2000 gpm groundwater wells and a potential 20 mgd surface water treatment plant. Stakeholder communications, public outreach, and engagement of an expert panel were also integrated in the project to gain support for the implementation plan of the selected approach.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	City of Coachella/Indio Water Authority Chromium-6 Treatment And Compliance Study (Indio, CA)		
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Project engineer and task leader evaluating groundwater treatment options in a \$250,424 study for 26 wells totaling over 86 mgd production capacity. The study is on-going and includes development of treatment process selection, cost development, and conceptual design. A regional surface water treatment plant will also be considered for treatment of Colorado River water and distribution system infrastructure upgrades will be identified.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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3.	(1) TITLE AND LOCATION (<i>City and State</i>) California Water Company Treatment Evaluation (Los Angeles, CA)	(2) YEAR COMPLETED	
		Professional Services Ongoing	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Examined treatment options for a groundwater well with hydrogen sulfide, color, manganese, and ammonia. As a project engineer, work on this \$58,288 study included a water quality review, bench-scale testing, development of a pilot-scale test plan, and an update of planning level treatment cost estimates. Pilot-testing is on-going.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	(1) TITLE AND LOCATION (<i>City and State</i>) California American Water - Chromium 6 Treatment Analysis	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE As a project engineer on this \$20,000 study, examined water quality, land availability, proximity of individual wells, residuals disposal, and capital and O&M costs for chromium 6 treatment options for three California American systems impacted by the proposed California MCL.	<input checked="" type="checkbox"/>	Check if project performed with current firm
5.	(1) TITLE AND LOCATION (<i>City and State</i>) Water Research Foundation and Coachella Valley Water District – Hexavalent Chromium Implementation Plans (Palm Desert, CA)	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE As a project engineer developed the implementation plan report that presented the system alternatives to combine and treat groundwater to comply with the California MCL for chromium 6. The Hazen and Sawyer portion of the evaluation (\$57,850) considered water quality, land availability, proximity of individual wells, residual disposal, and capital and O&M costs.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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a. NAME Troy Walker	b. ROLE IN THIS CONTRACT Project Manager / Technical Lead	c. YEARS EXPERIENCE	
		1. TOTAL 20	2. WITH CURRENT FIRM 2
d. LOCATION (City and State) Tempe, AZ			
e. EDUCATION (DEGREE AND SPECIALIZATION) BE Chemical Engineering, University of New South Wales, Australia Graduate of CO-OP Scholarship Program		f. PROFESSIONAL TRAINING - REGISTRATIONS Member of Engineers Australia	

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Professional Activities

AWWA – Membrane Process Committee
 AWWA – Membrane Systems Subcommittee
 American Membrane Technology Association
 Water Reuse Foundation
 Southwest Membrane Operators Association
 South Central Membrane Operators Association

Presentations

IWES Membrane Plant Design and Operation Short Course - Presenter (2007-2012)
 Ca-NV AWWA Annual Conference, "Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers for a DPR Scheme" (October 2014)
 WaterReuse Annual Conference, "Direct Potable Reuse Projects 13-03 (Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers for a DPR Scheme) and 13-13 Development of Operation and Maintenance Plan and Training and Certification Framework for Direct Potable Reuse (DPR) Systems" (September 2014)
 American Membrane Technology Association Membrane Technology Conference. "Know When to Hold 'em, Know When to Fold 'em. How long will low pressure membranes last?" (March 2014)
 South Central Membrane Association, San Antonio, TX, "Mastering Membrane Management: Getting the Best Value from your Membranes in the Long Run (August 2014)
 KN/TN AWWA, Chattanooga, TN, "Low Pressure Membrane Filtration Where Have We Been and Where Are We Headed?" (July 2014)
 AWWA/SWMOA Joint Conference, Newport, CA, "Seawater Design Hurdles" (July 2014)
 AZ Water, Glendale, AZ, "Droughts and Flooding Rains, Australia's Large Scale Water Recycling and Desalination Experience" (May 2014)
 SCMA Workshop, Fort Worth, TX, "Microfiltration and Ultrafiltration Tips and Traps" (April 2014)
 SCMA Workshop, Alamogordo, NM "Why I Wish I Had a Pilot Plant" (April 2014)
 American Membrane Technology Association, Membrane Technology Conference "High Pressure Membrane Plant Design" Workshop (March 2014)
 WaterReuse Industrial Reuse Conference, "Water Recycling for Industry: The Australian Experience" (December 2013)
 University of North Carolina, "Direct and Indirect Reuse" (October 2013)
 South Central Membrane Association, South Padre Is, Texas, "Large Scale Desalination: The Australian Experience" (October 2013)
 Veolia Water Technical Director's Conference Asia-Pacific. Presentation on climate impact on water operations in Australia. Shenzhen, China. (2011)
 Australian Water Association, Membranes and Desalination Specialty Conference, "Western Corridor Recycled Water Project Update" (February 2011)
 IWA Reuse Conference, Presenter, Brisbane Australia "Western Corridor's Bundamba Advanced Water Treatment Plant" (2009)
 American Membrane Technology Association Conference, Memphis Tennessee "Australia's Western Corridor Recycled Water Project Regulation of an Indirect Potable Recycling Scheme Down Under" (2009)

Selected Publications

Contribution of a chapter to the International Water Association's book Milestones in Water Reuse. Chapter 10 – Western Corridor Recycled Water Scheme; 2013.

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	City of Santa Monica, CA – Groundwater Treatment Plant Operations Support	2013	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Operational support and troubleshooting to resolve significant reverse osmosis fouling issue at the Arcadia 10 MGD groundwater treatment plant. The work resulted in almost complete removal of biological foulant and significant improvement in cleaning frequency, and lower operating energy requirements. Role – Project manager and key technical lead. \$70,000 scope.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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2.	(1) TITLE AND LOCATION (<i>City and State</i>) City of Beverly Hills, CA	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Operational management support and optimization for a 2.35 MGD groundwater RO system. This included an audit of operational systems and processes, minor design support for improvements, updates to operation plans, operator training and improvement of operational monitoring. Approximate value \$200,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	(1) TITLE AND LOCATION (<i>City and State</i>) Water Reuse Research Foundation (National) "Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers of a DPR Scheme"	(2) YEAR COMPLETED	
		Professional Services 2015	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Leading, operationally focused research as part of the Water Reuse Foundation Direct Potable Reuse Initiative. This project is collaborating with numerous utilities nationally, including the City of Scottsdale, to develop a design and operational methodology to ensure the reliability of direct potable treatment processes. Role – Principal Investigator Project Value – Approx. \$540,000	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	(1) TITLE AND LOCATION (<i>City and State</i>) Wateruse Research Foundation - Development of Operation and Maintenance Plan and Training and Certification Framework for Direct Potable Reuse (DPR) Systems (WRRF-13-13)	(2) YEAR COMPLETED	
		Professional Services 2015	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Leading, operationally focused research as part of the Water Reuse Foundation Direct Potable Reuse Initiative. This project is collaborating with numerous utilities nationally, including the City of Scottsdale, to develop an operator certification framework, and an operations management framework to ensure the operational reliability of direct potable reuse. Role – Principal Investigator Project Value – Approx. \$300,000	<input checked="" type="checkbox"/>	Check if project performed with current firm
5.	(1) TITLE AND LOCATION (<i>City and State</i>) Coachella Valley Water District, California. Groundwater treatment options study	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Investigation of groundwater treatment options for the management of Chrome VI in groundwater supplies. This has involved concept design, costing and evaluation of ion exchange systems, centralized regeneration facilities and of surface water treatment processes to supplement supplies. Role – Technical concept design of mobile ion exchange and centralized regeneration facility. Project value – \$420,000	<input checked="" type="checkbox"/>	Check if project performed with current firm



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Thomas Bradford Reisinger, PE	b. ROLE IN THIS CONTRACT Project Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 9	2. WITH CURRENT FIRM 1
d. LOCATION (City and State) San Francisco, CA			
e. EDUCATION (DEGREE AND SPECIALIZATION) BS Mechanical Engineering, California Polytechnic State University, San Luis Obispo Munich University of Applied Science, (International Exchange Program), Munich, Germany, Fall 2003 to Spring 2004		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: California	

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Professional Activities

American Membrane Technology Association
 Southwest Membrane Operators Association
 Water Reuse
 Bay Area Water Works Association

Selected Publications

“Application of RO in Recycled Water Facilities,” Brad Reisinger, presented at Southwest Membrane Operator Association Conference, September 2012.
 “Failure Modes of UF / MF Hollow Fiber Membranes,” Brad Reisinger, presented at American Membrane Technology Association, September 2011.
 “Major Manufacturers and New Developments,” Brad Reisinger, presented at California – Nevada Section of American Water Works Association, September 2011.
 “New Microfiltration Facility: From Concept to Reality,” Brad Reisinger, presented at Southwest Membrane Operator Association Conference, February 2010.

H. RELEVANT PROJECTS

1.	(1) TITLE AND LOCATION (City and State) Chaparral WTP Microfiltration System upgrades – Blower systems modifications (Scottsdale, Arizona)	(2) YEAR COMPLETED	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Chaparral WTP microfiltration system upgrades (rapid drain implementation). As a project engineer Mr. Reisinger evaluated several options to modify the existing low pressure air system such that it could operate within the original design constraints as well as the new modified MF tank drain mode. Performed mechanical design and modified control narrative. The Chaparral WTP is a 30 mgd surface water plant consisting of microfiltration followed by granular activated carbon contactors. (July 2013 – October 2014) Original Fee: \$300K Original Construction Cost: \$5Million	Professional Services 2014	Construction (if applicable)
		<input type="checkbox"/> Check if project performed with current firm	
2.	(1) TITLE AND LOCATION (City and State) Water Campus MF System Clean Water Flux Tests (Scottsdale, Arizona)	(2) YEAR COMPLETED	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Helped the City of Scottsdale navigate a warranty issue with their Siemens CP microfiltration (MF) system, Mr. Reisinger performed clean water flux tests (CWFT) on all the replacement MF modules that were installed in 2013/14 to establish base line performance data to be used to evaluate the membrane performance as they age. In addition to the CWFT, four of the MF units were tested for two (2) 40 day run cycles to prove the membranes performed in accordance with the contract specifications. (October 2013 – June 2014) Original Fee: \$1.4M Original Construction Cost: \$27.4M	Professional Services 2014	Construction (if applicable)
		<input type="checkbox"/> Check if project performed with current firm	
3.	(1) TITLE AND LOCATION (City and State) MRWPCA ground water recharge pilot study (Monterey, California)	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)



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	<p>(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE</p> <p>Project Engineer – The “Pure Water Monterey” pilot was a proof of concept test that consisted of Ozone, Ultrafiltration (UF), and Reverse Osmosis (RO) to treat 17 gpm of secondary effluent for ground water recharge. Mr. Reisinger operated Two hollow fiber UF skids (1 inside-out and 1 outside-in) and 1 RO skid over 7 months during which operating data was normalized weekly and used to optimized system operating conditions and determine cleaning frequencies. Following the completion of testing, a report summarizing the membrane test was developed. Operating data and results were used for full scale system design criteria (September 2013 – July 2014). Total cost approximately \$100,000.</p>	<input type="checkbox"/> Check if project performed with current firm		
4.	<p>(1) TITLE AND LOCATION (<i>City and State</i>) Foss Reservoir MF/RO Pilot (Clinton, Oklahoma)</p> <p>(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE</p> <p>The Foss reservoir Pilot project was a proof of concept pilot to evaluate microfiltration (MF) as pretreatment to reverse osmosis to treat surface water from the Foss Reservoir. Mr. Reisinger developed the pilot protocol and assisted with equipment installation and start-up. Once the pilot was in operation the operating data was normalized and evaluated weekly to be used to assist the District with operations. The data was used to evaluate operating parameters, cleaning requirements, and antiscalant effectiveness. Following the completion of operations, a final report was generated. (July 2013 to February 2014) Total cost \$600,000.</p>	<p>(2) YEAR COMPLETED</p> <table border="1"> <tr> <td>Professional Services 2014</td> <td>Construction (if applicable)</td> </tr> </table> <input type="checkbox"/> Check if project performed with current firm	Professional Services 2014	Construction (if applicable)
Professional Services 2014	Construction (if applicable)			
5.	<p>(1) TITLE AND LOCATION (<i>City and State</i>)</p> <p>(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE</p>	<p>(2)</p> <table border="1"> <tr> <td>Professional Services</td> <td>Construction (if applicable)</td> </tr> </table> <input type="checkbox"/> Check if project performed with current firm	Professional Services	Construction (if applicable)
Professional Services	Construction (if applicable)			



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Charles Witt	b. ROLE IN THIS CONTRACT Technician	c. YEARS EXPERIENCE	
		1. TOTAL 2.5	2. WITH CURRENT FIRM 1
d. LOCATION (City and State) Tempe, AZ			
e. EDUCATION (DEGREE AND SPECIALIZATION) Arizona State University – Chemical Engineering expected in 2017 Palomar/MiraCosta Community College		f. PROFESSIONAL TRAINING - REGISTRATIONS N/A	

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Professional Activities
N/A

H. RELEVANT PROJECTS

1.	(1) TITLE AND LOCATION (City and State) West Basin Ocean Water Desalination Demonstration Facility Decommissioning Project – Redondo Beach, CA	Professional Services 2014	Construction (if applicable) 2015 (estimated)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Lead drafter for the project. Worked with a Hazen & Sawyer design engineer for mechanical and structural disciplines developing plans for the decommissioning of a seawater desalination demonstration plant at the SeaLab in Redondo Beach, CA. Project included creating a salvage plan to demolish existing pipes and salvage existing equipment for potential buyers. The project is currently in the final design stage.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	(1) TITLE AND LOCATION (City and State) Newland Communities – Goodyear, AZ	Professional Services 2014	Construction (if applicable) 2016 (estimated)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Developed preliminary design drawings of new WTP and of alternative configurations for potential future plant expansion in multiple phases. This initial phase includes evaluation and design of a new RO facility that includes, evaporation ponds, RO trains, CIP system, cartridge filters, an electrical room and control room. Phase 2 expansion would entail addition of additional RO trains. Project is currently in-planning and design for the facility is anticipated to commence in 2015. Original Fee: \$55k Original Construction Cost: \$27.8 million (Estimated)	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	(1) TITLE AND LOCATION (City and State) Coachella Valley Water District – Coachella, CA	Professional Services 2014	Construction (if applicable) 2015-2018 (estimated)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE The Coachella Valley Water District is planning to implement a \$300M project to add treatment for Chrome 6 based on the new California regulation of 10 PPB. Developed preliminary design drawings for alternatives evaluation and cost estimating evaluate multiple treatment technologies, including oxidation/filtration, ion exchange and surface water importation and treatment. The project is in the planning phase and design is anticipated to commence in 2015.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	(1) TITLE AND LOCATION (City and State) West Basin Municipal Water District Operation Support – Carson, CA	Professional Services 2014	Construction (if applicable) N/A
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Analyzed client data as part of a performance evaluation of RO and MF systems for all West Basin facilities. Data was compiled and evaluated to provide recommendations on improving systems performance. Additional water quality and equipment performance data is currently being collected and analyzed.	<input type="checkbox"/>	Check if project performed with current firm



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5.	(1) TITLE AND LOCATION (<i>City and State</i>) San Patricio Municipal Water District TPCO Expansion Project – Ingleside, TX	(2) <table border="1" style="width: 100%;"> <tr> <td style="width: 60%;">Professional Services 2014</td> <td style="width: 40%;">Construction (if applicable)</td> </tr> </table>		Professional Services 2014	Construction (if applicable)
	Professional Services 2014	Construction (if applicable)			
(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Lead drafter for project. Worked with two sub-consultants that worked on structural and electrical disciplines. The SPMWD TPCO Expansion Project consisted of an expansion to Plant C of the Ingleside facility. The expansion included an additional sedimentation basin, a new alum tank and metering pump, new MF feed pump, and 3 additional MF units. The project is currently bidding for construction.	<input type="checkbox"/> Check if project performed with current firm				



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Jack C. Kiefer, Ph.D.	b. ROLE IN THIS CONTRACT Resources, Economics and Planning	c. YEARS EXPERIENCE	
		1. TOTAL 23	2. WITH CURRENT FIRM 7
d. LOCATION (City and State) Marion, IL			
e. EDUCATION (DEGREE AND SPECIALIZATION) PhD Southern Illinois University, Geography MA Southern Illinois University, Monetary Economics, Development Economics BA Southern Illinois University, Economics		f. PROFESSIONAL TRAINING - REGISTRATIONS	

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Professional Activities

American Water Works Association
 American Water Resources Association

Selected Publications

Analysis of Changes in Water Use under Regional Climate Change Scenarios. 2013. J. Kiefer, J. Clayton, B. Dziegielewski, and J. Henderson. Copyright © Water Research Foundation, Denver.

“Appropriate Design and Evaluation of Water Use and Conservation Metrics and Benchmarks”. 2010. B. Dziegielewski and J. Kiefer. *Journal of the American Water Works Association*, Volume 102, No. 6.

Water Conservation Measurement Metrics. 2010. B. Dziegielewski and J. Kiefer. American Water Works Association, Denver CO. Copyright © American Water Works Association, Ben Dziegielewski, Jack C. Kiefer. All Rights Reserved.

U.S. Water Demand, Supply and Allocation: Trends and Outlook. B. Dziegielewski and J. Kiefer. 2007. IWR Report 2007-R-03, Institute for Water Resources, Alexandria, Virginia.

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services Ongoing	Construction (if applicable)
1.	Water Research Foundation Project 4458, Water Demand Forecasting in Uncertain Times: Isolating the effects of the Great Recession (National/Denver, CO)		
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE This project is evaluating the impact of the recent economic downturn on water demand, which includes 10 utility participants. The project will develop case studies to examine how economic pressures affect demand and how economic indicators may be used to improve water demand forecasting. In addition, a broad national survey of utilities will be undertaken to gain perspectives and observations on recession impacts at large. (Specific Role: Principal Investigator; Budget: \$360,000; to be completed fall 2015)	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	Water Research Foundation Project 4735, Methodology for Determining Baseline Commercial, Institutional and Industrial End Uses of Water (National/Denver, CO)		
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE This project is defining best practices for evaluating water use in the CII sector for the purposes of forecasting, rate-making, water budgeting, and efficiency planning. The methodology will prescribe sources of information, classification, and survey techniques for estimating water use patterns in the heterogeneous CII sector. This project is collaborating with numerous utilities nationally, including the City of Phoenix. (Specific Role: Principal Investigator; Budget: \$225,000; to be completed spring 2015)	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	Enhancements to New York City’s Long-Term Water Demand Forecasting Model, New York City Department of Environmental Protection (New York, New York)		
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE This project is defining best practices for evaluating water use in the CII sector for the purposes of forecasting, rate-making, water budgeting, and efficiency planning. The methodology will prescribe sources of information, classification, and survey techniques for estimating water use patterns in the heterogeneous CII sector. This project is collaborating with numerous utilities nationally, including the City of Phoenix. (Specific Role: Principal Investigator; Budget: \$225,000; to be completed spring 2015)	<input checked="" type="checkbox"/>	Check if project performed with current firm



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(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE		<input checked="" type="checkbox"/> Check if project performed with current firm	
This project made incremental improvements to NYC DEP's long-term water demand forecasting model to incorporate key future trends and uncertainties related to water efficiency and climate. The updated model included a water efficiency index, climatic variables, and residual variance factors at both annual and monthly time steps, which supports development of multiple forecast scenarios. (Specific Role: Technical Director; Budget: \$292,200)			
(1) TITLE AND LOCATION (<i>City and State</i>)		(2) YEAR COMPLETED	
Water Demand Management Plan, Tampa Bay Water, FL		Professional Services Dec 2013	Construction (if applicable)
(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE		<input checked="" type="checkbox"/> Check if project performed with current firm	
4.	The focus of Tampa Bay Water's Water Demand Management Plan (DMP) was to identify achieved water savings from both natural plumbing replacement and active utility-sponsored programs and to estimate the potential and net economic benefits from additional future investments in water conservation as an alternative source of water supply. The project involved the matching of parcel data to water customer billing information across all customers served in the region, including the mapping of Florida Department of Revenue classifications to CII customers, and cost-effectiveness analysis and ranking of alternative programs. (Specific Role: Project Manager; Budget: \$1,015,370)		
(1) TITLE AND LOCATION (<i>City and State</i>)		(2) YEAR COMPLETED	
Water Research Foundation Project 4263, Analysis of Changes in Water Use under Regional Climate Change Scenarios (National/Denver, CO)		Professional Services Dec 2013	Construction (if applicable)
(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE		<input checked="" type="checkbox"/> Check if project performed with current firm	
5.	This study investigated potential impacts of climate change on water demand and principal urban water sector. The study reviewed and developed methods for modeling the connection of weather to water use and demand variability, as well as methods for demand forecasting that can incorporated climate change forecasts. The study developed 6 case studies to estimate the potential impact of climate change using regionally downscaled climate scenarios. (Specific Role: Principal Investigator; Budget: \$360,000)		



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Gerald J. Ratasky, PE	b. ROLE IN THIS CONTRACT Electrical Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 38	2. WITH CURRENT FIRM 20
d. LOCATION (City and State) Raleigh, NC			
e. EDUCATION (DEGREE AND SPECIALIZATION) BSEE University of Toledo		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: Arizona, California, North Carolina, Texas, South Carolina, Virginia, Maryland, District of Columbia, Georgia, Florida, Ohio, Michigan, Illinois, Pennsylvania, Minnesota	
g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.) Professional Activities International Society for Automation, Senior Member			

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
	Thomas P. Smith WRF Improvements Project, City of Tallahassee, FL	2011	Ongoing
1.	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
	Mr. Ratasky directed the electrical design of the project at the 26.5-mgd facility. Major process facilities include new headworks, primary clarifiers, activated sludge upgrades for AWT nutrient removal, denitrification filters, anaerobic digestion, centrifuge dewatering, and thermal sludge drying. The electrical design included a complete renovation of the power distribution system. Dual utility supplies provide power to a new 15kV Class switchgear assembly with provisions for future standby generators. The new switchgear supplies power to low voltage power distribution and motor control equipment to support all the new process facilities. The project design team used AutoCAD 3D for new structures and for modeling the yard piping and electrical ductbanks. All motor control centers were designed as Intelligent MCCs utilizing Devicenet for communication with the PLC. Wireless network points were installed throughout the plant for utilization of wireless pen tablets for process control. Cost: \$180M – estimated. Status: Construction is expected to be complete in 2015.		
	East Central Regional WRF Biosolids Improvements, City of West Palm Beach, FL	Ongoing	
2.	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
	Mr. Ratasky is directing the electrical design of the biosolids improvements at the 70-mgd facility. The project includes upgrade of an existing gravity belt thickening facility, new waste activated sludge storage with PD blowers, installation of six new anaerobic digesters and associated equipment, five new dewatering centrifuges, new septage and FOG receiving stations, and conversion of an existing aerobic digester to an aeration basin. The electrical system design includes modifications to the main power distribution system. New 5kV class switchgear was provided to supply the digester, dewatering, and thickening facilities. The new 5kV switchgear is supplied from the existing main power distribution switchgear lineup, which is connected to dual utility supplies and standby turbine generators. The new switchgear supplies power to low voltage power distribution and motor control equipment to support all the new process facilities. Cost: \$90M - estimated. Status: Construction has not started yet but is expected to be complete in 2016.		
	Southwest WWTP High Level Disinfection Improvements, City of Sunrise, FL	2013	Ongoing
3.	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
	Mr. Ratasky directed the electrical design for the project at the 0.99-mgd facility, which included a new main electrical building to house the new low voltage power distribution and motor control equipment. The new low voltage power circuit breaker switchgear serves as the plant's new service entrance equipment and will supply all new and existing loads in the plant. One new diesel-fueled standby generator set and provisions for a second machine are incorporated into the electrical design. Cost: \$20M - estimated. Status: Construction is expected to be complete in 2016.		



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	(1) TITLE AND LOCATION (<i>City and State</i>)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
4.	Granite City Water Treatment Facility Clearwell Addition, Illinois American Water, Granite City, Il	2013	2013
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Mr. Ratasky directed the design of electrical improvements for the addition of a 2.5-mgd clearwell to serve the 15-mgd WTF. This was a design-build project. Cost: \$9,590,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
5.	Hanahan WTP Filter Upgrade, Charleston Water System, Charleston, SC	2014	Ongoing
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Mr. Ratasky directed electrical design of the filter upgrade project at the 91-mgd facility. The project included retrofit of 20 deep bed filters with electrically actuated flow control valves. In addition the filter gallery was retrofitted with new LED light fixtures to increase visibility for maintenance staff and new HVAC systems to condition the air and reduce humidity in the filter gallery. Cost: \$5M - estimated. Status: Construction began in 2014.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Adam D. Overbay, PE, SE	b. ROLE IN THIS CONTRACT Structural Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 18	2. WITH CURRENT FIRM 17

d. LOCATION (City and State)
Charlotte, NC

e. EDUCATION (DEGREE AND SPECIALIZATION) MCE North Carolina State University BSCE North Carolina State University	f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: Arizona, California, North Carolina, South Carolina, Georgia, Virginia, Indiana, Iowa, Delaware, Pennsylvania, Tennessee, New York, Florida Structural Engineer: Illinois
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g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)
Professional Activities
 American Concrete Institute, ACI Committee 350, Environmental Engineering Concrete Structures - Associate Member
 American Institute of Steel Construction
 International Concrete Repair Institute
 American Society of Civil Engineers

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Muddy Creek Wastewater Treatment Plant – Clarifier Upgrades Winston-Salem, NC	2012	2014
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE The upgrades at Muddy Creek involved the design and construction of a new 125' diameter reinforced concrete clarifier, upgrades to existing tanks, an expansion to the plant distribution structure, and the addition of precast and metal buildings to the site. We also designed repairs to failing prestressed concrete pipe. Mr. Overbay was the lead structural engineer (EOR). Total project cost was \$12M.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	Improvements and Upgrades to the Irwin Creek Wastewater Treatment Plant Charlotte, NC	2012	2014
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE The Irwin Creek project was a significant expansion of an 80 year old WWTP. The project involved the construction of a new electrical building, reinforced concrete tank, and generator building. It also included major renovations to the Influent Pump Station and other site structures. These renovations included condition assessment and concrete repair. Mr. Overbay was the lead structural engineer (EOR). Total project cost was \$20.9M.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	Oxygen Plant Demolition at Plant No. 2 Huntington Beach, CA	2014	2015
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Mr. Overbay served as the lead structural engineer for this project which will remove disused Air Separation Facilities. Mr. Overbay's role included evaluating the existing structure for revisions to equipment and designing and detailing required strengthening of the existing building support system. Total project cost is \$1.5 M.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	Noman Cole Pollution Control Plant – Dry Ash Handling System Improvements Fairfax County, VA	2013	2015
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE		



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	<p>(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE</p> <p>Mr. Overbay led the structural design (EOR) of the modifications to the existing structures. These modifications included constructing a reinforced concrete and steel frame inside the existing multistory building to support pumps on an elevated floor. The project also included the design of strengthening to allow the additions of large openings to existing masonry walls. Total project cost is \$3.9M.</p>	<p><input checked="" type="checkbox"/> Check if project performed with current firm</p>		
5.	<p>(1) TITLE AND LOCATION (<i>City and State</i>)</p> <p>Neabsco Lift Station Replacement Prince William County, VA</p>	<p>(2) YEAR COMPLETED</p> <table border="1"> <tr> <td>Professional Services 2012</td> <td>Construction (if applicable) 2015</td> </tr> </table>	Professional Services 2012	Construction (if applicable) 2015
Professional Services 2012	Construction (if applicable) 2015			
	<p>(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE</p> <p>Mr. Overbay led the structural design of the Neabsco Lift Station (EOR) and led the structural construction administration. The lift station is a 60'x80'x 50' deep reinforced concrete lift station consisting of a wet well and a dry pump room. The structure also includes a 40' tall reinforced concrete frame superstructure. Total project cost is \$10.8M.</p>	<p><input checked="" type="checkbox"/> Check if project performed with current firm</p>		



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Paul C. Bassette, PE, BCEE	b. ROLE IN THIS CONTRACT Water and Wastewater Design/Project Management	c. YEARS EXPERIENCE	
		1. TOTAL 28 YEARS	2. WITH CURRENT FIRM 1 YEAR
d. LOCATION (City and State) Fairfax, VA			
e. EDUCATION (DEGREE AND SPECIALIZATION) BS Montana State University, Construction Engineering		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: CA, VA, MD, NY Project Management Professional (PMI)	
g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)			

Professional Activities

Water Environment Federation and VA Water Environment Association
 American Academy of Environmental Engineers

Selected Publications

Zero Net Energy, Gloversville-Johnstown WWTP, VA WaterJAM, 2012
 Optimizing Pump Performance to Reduce Energy Consumption, NJWEA Conference and Exhibition, 2008
 Carbon Dioxide Feed System for Enhanced Coagulation, AWWA Engineering and Construction Conference, 1999

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Loudoun Water Raspberry Falls Water Works Loudoun County, VA	2014	NA
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Design and Quality Leader for the design of a 250,000 gpd membrane filtration plant designed to treat ground water under the influence surface water. The project includes upgrades to the existing booster pumps, a new facility for low pressure membranes and chemicals, and a new 180,000-gallon water storage tank. Estimated construction cost is \$4M.	<input type="checkbox"/> Check if project performed with current firm	
2.	Frederick-Winchester Service Authority, Basic Ordering Agreement Winchester, VA	2014	2015 (estimated)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Design and Quality Leader for providing as-needed engineering services at FWSA's Opequon WRF and Parkins Mills WWTP. Services include providing assistance to FWSA for the implementation of energy improvements and generation facilities at the Opequon WRF under a \$40M energy performance contract. Other assignments include evaluation of industrial discharges at Parkins Mills WWTP and chemical facility improvements and other miscellaneous assignments at the Opequon WRF.	<input type="checkbox"/> Check if project performed with current firm	
3.	Alexandria Renew Reclaimed Water Distribution System Alexandria, VA	2014	NA
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Design and Quality Leader for Task Orders associated with the development of a reclaimed water system. Task Orders included development of a Preliminary Engineering Report, Reclaimed Water Distribution System Master Plan, Permitting, and Rate Study. The estimated cost to construct the first phase of the reclaimed water line is approximately \$6M.	<input type="checkbox"/> Check if project performed with current firm	
4.	Loudoun Water Raw Water Intake and Potomac Raw Water Pumping Station Loudoun County, VA	2013	2016 (estimated)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Design and Quality Leader for the design of a 40 MGD raw water intake and pump station. The raw water intake consists of a half barrel screens and two 36-inch intake pipes installed in a river bank tunnel. The pump shaft is constructed in a shaft constructed in hard rock and includes four 900 hp vertical lineshaft pumps. Construction Cost: \$26M.	<input type="checkbox"/> Check if project performed with current firm	



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	(2) YEAR COMPLETED	
(1) TITLE AND LOCATION (<i>City and State</i>) DC Water Separate Sewer System Rehabilitation & Replacement Capital Program Washington, DC	Professional Services 2014	Construction (if applicable) NA
5. (3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE Task leader for various assignments under a \$30M program that included inspection and assessment of combined sewer system control structures, pump station assessments, evaluation for the reactivation of an abandoned interceptor as an emergency backup, and the review of design documents for pump station and collection system upgrades produced by other consultants.	<input type="checkbox"/> Check if project performed with current firm	



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Mark M. Bishop, PE, BCEE	b. ROLE IN THIS CONTRACT Technical Lead	c. YEARS EXPERIENCE	
		1. TOTAL 35	2. WITH CURRENT FIRM 17
d. LOCATION (City and State) Raleigh, NC			
e. EDUCATION (DEGREE AND SPECIALIZATION) MSE Michigan State University BSC University of Michigan		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: Arizona, Virginia, North Carolina, Maryland, Michigan, New York, Ohio, Illinois, Iowa	

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Professional Activities
 American Academy of Environmental Engineers, (Diplomat)
 Honorary Member AWWA
 George Warren Fuller Award (AWWA)
 Duke University - Advisory Board
 American Water Works Association:
 Trustee, Engineering and Construction Division, 1993 - 1997
 Chair, Virginia Section, 1997, 1998
 Trustee, Virginia Section, 1995 - 1999
 Chair, Disinfection Committee,
 Water Quality Division, 1994 - 1997
 Chair, Disinfection/Disinfection By-Products, Sunday Seminars, 1994, 1995, 1996
 Liaison, Engineering/Construction Research Committee
 Chair, Water Quality Committee, Virginia Section
 Chair, Strategic Planning Committee,
 Virginia Section, 2002 – 2005
 Chair – AWWA Capital Project Delivery Committee – 2012-Present

Selected Publications
 TEXT

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	ASHBURTON ZONE 2 TANKS, CITY OF BALTIMORE, MD	ONGOING PROJECT	ONGOING PROJECT
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE DESIGN OF TWO 25 MG FINISHED WATER STORAGE TANKS FOR THE ASHBURTON WTP TO REPLACE OPEN RESERVOIR STORAGE. SITE INCLUDE PARK AREAS AND INTEGRATION INTO THE EXISTING 170 MGD WTP. PROJECT IS A JOINT VENTURE WITH AECOM AND ROLE IS PROJECT DIRECTOR FOR JV. ESTIMATED 50 M CONSTRUCTION COSTS.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	HANAHAN FILTER UPGRADE CHARLESTON WATER SYSTEM CHARLESTON, SC	2014	ONGOING PROJECT
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE PRELIMINARY AND FINAL ENGINEERING FOR 110 MGD FILTRATION FACILITY FOR THE HANAHAN WTP SERVING THE CITY OF CHARLESTON. PROJECT TECHNICAL ADVISOR FOR EVALUATION OF OPTIONS AND DESIGN OF COMPREHENSIVE FILTER UPGRADES INCLUDING FILTER BOTTOMS, BLOWERS, AIR SCOUR, VALVING, CONTROLS, CONCRETE REPAIRS, ETC. TECHNICAL ADVISOR AND PROJECT DIRECTOR. DESIGN COMPLETE, BID COMPLETE, ONGOING MOVING INTO CONSTRUCTION PHASE. ESTIMATED 9 M CONSTRUCTION COSTS.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	WATER PLANT UPGRADES FOR FIVE WTPS CHARLOTTESVILLE, VA	ONGOING PROJECT	ONGOING PROJECT
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE		



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<p>WTP PROJECTS RELATED TO THE COMPLIANCE WITH STAGE 2 D/DBP RULE AND GENERAL FACILITY RELIABILITY UPGRADES FOR PLANTS RANGING IN SIZE FROM 0.25 TO 12 MGD. INSTALLATION OF GAC CONTACTORS, FILTER UPGRADES, CHEMICAL FEED UPGRADES, RESIDUALS MANAGEMENT UPGRADES INCLUDED.</p> <p>SERVED AS PROJECT MANAGER AND PROJECT DIRECTOR SINCE 2010 INITIATION OF THIS EFFORT. PRELIMINARY AND FINAL DESIGN AND FUTURE CONSTRUCTION ADMINISTRATION. ESTIMATED 20 M CONSTRUCTION COSTS.</p>		<input checked="" type="checkbox"/> Check if project performed with current firm
4.	(1) TITLE AND LOCATION (<i>City and State</i>)	(2) YEAR COMPLETED
	DBP COMPLIANCE PROJECT CITY OF EDEN, NC	Professional Services ONGOING PROJECT
		Construction (if applicable) ONGOING PROJECT
(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE		<input checked="" type="checkbox"/> Check if project performed with current firm
<p>PRELIMINARY AND FINAL DESIGN FOR THE INSTALLATION OF CHLORAMINE FEED SYSTEM FOR 18 MGD WTP FOR COMPLIANCE WITH THE STAGE 2/D/DBP RULE AND MITIGATION OF BROMINATED DBO INCREASES DUE TO WW POWER FACILITY DISCHARGES UPSTREAM. WORK INCLUDED EVALUATION OF IMPACTS, OPTIONS EVALUATION, PER, DESIGN OF CHLORAMINE FEED SYSTEM, CLEARWELL MODIFICATIONS AND RELATED COMPONENTS. SUPPORT OF PUBLIC INFORMATION EFFORTS ALSO INCLUDED.</p> <p>ROLE IS PROJECT DIRECTOR AND TECHNICAL ADVISOR. ESTIMATED 1.5 M CONSTRUCTION COSTS.</p>		
5.	(1) TITLE AND LOCATION (<i>City and State</i>)	(2) YEAR COMPLETED
	DAF AND BIOLOGICAL FILTRATION STUDY GREENSBORO, NC	Professional Services ONGOING PROJECT
		Construction (if applicable) ONGOING PROJECT
(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE		<input checked="" type="checkbox"/> Check if project performed with current firm
<p>PILOT TESTING AND EVALUATION OF THE PERFORMANCE OF DAF AND BIOLOGICAL FILTRATION FOR THE UPGRADE OF TWO WTPS (18 AND 24 MGD) SERVING THE CITY OF GREENSBORO, NC. PREVIOUS WORK HAS INCLUDED MAJOR UPGRADES TO CHEMICAL FEED SYSTEMS AT BOTH PLANTS. THE WORK IS RELATED TO UPGRADING PLANT RELIABILITY AND CONTINUED CHALLENGES WITH SOURCE WATER QUALITY.</p> <p>ROLE IS PROJECT TECHNICAL ADVISOR AND QA/QC. 400K ENGINEERING WITH CONSTRUCTION.</p>		



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Ian C. Mackenzie, PE	b. ROLE IN THIS CONTRACT Project Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 24	2. WITH CURRENT FIRM 2

d. LOCATION (City and State)
Los Angeles, CA

e. EDUCATION (DEGREE AND SPECIALIZATION) BSc Queens University (Canada), Civil Engineering	f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: California
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g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)
Professional Activities
 California Water Environment Association – WEF Delegate Director

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Ocean Water Desalination Demonstration Facility Decommissioning (Redondo Beach, CA)	In progress	Scheduled for 2015
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Mr. Mackenzie is serving as Design Engineer for this (\$1 million) project which will decommission an existing desalination pilot facility in Redondo Beach CA. The aim of the project is to return the facility to its pre-existing condition while maximizing re-use of the existing pilot facilities. Mr. Mackenzie has overall responsibility for the preparation of bid documents for the decommissioning project.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	Oxygen Plant Demolition at Plant No. 2 (Huntington Beach, CA)	Design Completed 2014	Scheduled for 2015
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Mr. Mackenzie is serving as Project Manager for this (\$1.5 million) project which will remove disused Air Separation Facilities. Mr. Mackenzie's role includes both technical and financial management of the project. Key issues include identifying means of safely removing existing equipment without affecting the treatment process or endangering adjacent high purity oxygen facilities and dealing with hazardous materials such as asbestos and lead.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	Domestic Water System Source of Supply/Treatment Study (Palm Desert, CA)	In progress	Scheduled for 2017
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Mr. Mackenzie served as Design Engineer for this (\$200 million) project which will improve the security and quality of water supply to California's Coachella Valley Region. The project evaluated a series of options involving both groundwater and surface water supplies. Mr. Mackenzie was responsible for developing conceptual designs for option evaluation and will lead the team that designs the new treatment facilities.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	Cr VI Program, Santa Ynez River Water Conservation District (Santa Ynez, CA)	In progress	Scheduled for 2016
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Mr. Mackenzie served as Design Engineer for this (\$4 million) project which will improve the security and quality of water supply to Improvement District No.1 in Santa Ynez CA. The project evaluated a series of treatment and well modification options to reduce Chromium VI levels in well water. Mr. Mackenzie was responsible for developing conceptual designs for option evaluation and will lead the team that designs the new treatment facilities.	<input checked="" type="checkbox"/>	Check if project performed with current firm
5.	Review of Existing Slipline Technical Specifications and Temporary Odor Control	2013	N/A



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Systems, (Los Angeles, CA)

(3) BRIEF DESCRIPTION (*Brief scope, size, cost, etc.*) AND SPECIFIC ROLE

Check if project performed with current firm

Mr. Mackenzie led the technical team that updated the Slipline Grouting Specification and Temporary Odor Control Specification for large and medium diameter collection system pipe rehabilitation. The project included a technical review of the existing specifications, interview of City staff to identify lessons learned from previous projects and a survey of other agencies to identify current best practice.



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4. Resumes of Key Personnel Proposed for this Contract *(Complete one Section 4 for each key person.)*

a. NAME Daniel B. Edwards, PE	b. ROLE IN THIS CONTRACT Instrumentation and Control Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 29	2. WITH CURRENT FIRM 29
d. LOCATION <i>(City and State)</i> Raleigh, NC			
e. EDUCATION <i>(DEGREE AND SPECIALIZATION)</i> ME West Virginia Institute of Technology BSCE West Virginia Institute of Technology		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: North Carolina, Florida, Virginia, District of Columbia, Maryland, Georgia, Ohio, Michigan, Texas, Tennessee, Massachusetts	
g. OTHER PROFESSIONAL QUALIFICATIONS <i>(Organizations, Awards, etc.)</i>			

Professional Activities
International Society for Automation
American Water Works Association
Water Environment Federation
North Carolina AWWA-WEA
Automation Committee, Past Chair
WERF - Member of Exploratory and Issue Area Teams for Global Sensors Project

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION <i>(City and State)</i>	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	SCADA System Replacement, North and South Durham WRFs Durham, NC	2013	Ongoing
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Mr. Edwards supervised design services required to replace the operator interface software for both 20 mgd WRFs as part of a larger chemical feed and nutrient removal improvements project. The project featured object-oriented Human-Machine Interface software with remote thin client technology, incorporated the latest concepts in high-performance HMI application and alarm management design, and included coordination with the City's existing data management software. The BNR controls for both facilities were modified to use state-of-the-art ammonia-based dissolved oxygen control strategies. Cost of the controls portion of the project was \$2,106,000	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	SCADA System Rockville, MD	2013	Ongoing
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Mr. Edwards was Project Manager for a SCADA system evaluation, preliminary design, and final design for the project. The project incorporated existing and future water storage tanks, pressure reducing valves, and a booster pumping station into a comprehensive SCADA system. The SCADA system allows personnel from the water treatment plant and distribution system to monitor and control these remote facilities. The design was coordinated with the City Information Technology staff to ensure all relevant standards were met. Cost of the system is approximately \$500,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	SCADA System Evaluation and Design Project Cape Fear Public Utility Authority, Wilmington, NC	Ongoing	
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Mr. Edwards is currently serving as project manager for a project to evaluate and design improvements for CFPUA's SCADA systems. Under this project, Hazen and Sawyer will initially evaluate and document the Authority's existing SCADA infrastructure. Vulnerabilities in both operational and cyber-based security will be identified. The project will include working with the Authority water, wastewater, and IT staffs to develop a vision for a unified, enterprise-wide SCADA system to serve all of the utility's needs. The training needs of the Authority's staff and the potential for insourcing SCADA service and support will be assessed and recommendations made. The final phase of the project will include developing plans and specifications to implement that vision in a prioritized manner. Total costs for the recommended improvements will likely exceed \$3,000,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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	(1) TITLE AND LOCATION (<i>City and State</i>)	(2) YEAR COMPLETED	
	Wastewater Pumping SCADA System Town of Cary, NC	Professional Services 2013	Construction (if applicable) Procurement Underway
4.	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
	Mr. Edwards was Project Manager for the design of the project which included new remote telemetry units (RTUs) and cellular communications at eight Tier 1 pumping stations, along with the electrical and control work necessary to provide the desired monitoring and control functions. This project provides the basic infrastructure for a future Town-wide SCADA system for 43 wastewater pumping stations. The system architecture is based on the latest version of Wonderware System Platform and was closely coordinated with the control system for a major regional wastewater treatment facility. Cost of the system is \$980,000.		
	(1) TITLE AND LOCATION (<i>City and State</i>)	(2) YEAR COMPLETED	
	CAT-212C Gilboa Dam Reconstruction NYC Environmental Protection	Professional Services 2014	Construction (if applicable) Procurement Underway
5.	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
	Mr. Edwards provided initial instrumentation design oversight and performed QA/QC review for a reconstruction project at the Gilboa Dam on the Schoharie Reservoir. The work includes monitoring flows through the main fixed cone valves for the Low Level Outlet (LLO) and the low flow jet valve, water levels in the tunnels and gate shafts between the dam and the LLO, and control of the various gates required to operate the system. Data from the gate shaft and LLO locations will be transmitted to DEP's facility in Grahamsville, NY. Mr. Edwards is also assisting with instrumentation design services for project CAT-212D. This contract includes work at the intake for the Shandaken Tunnel, which delivers water from the Schoharie Reservoir to Esopus Creek and the Ashokan Reservoir. This work is primarily associated with flow monitoring at the Shandaken Tunnel Inlet Chamber (STIC). Total cost of the system is estimated to be \$1,200,000.		



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Alan Vestal, P.E., LEED AP	b. ROLE IN THIS CONTRACT Plumbing / HVAC	c. YEARS EXPERIENCE	
		1. TOTAL 30	2. WITH CURRENT FIRM 4
d. LOCATION (City and State) Columbus, OH			
e. EDUCATION (DEGREE AND SPECIALIZATION) BAG E The Ohio State University		f. PROFESSIONAL TRAINING - REGISTRATIONS Professional Engineer: Ohio, Kentucky, Virginia, North Carolina, Tennessee, Pennsylvania	
g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)			

Professional Activities

American Society of Heating, Refrigerating, and Air-Conditioning Engineers
 United States Green Building Council – Central Ohio Chapter Member

Selected Publications

HVAC Design Considerations for the Water and Wastewater Industry (April 29, 2014)

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED:	
		Professional Services	Construction (if applicable)
1.	City of Nashua, CSO Screening & Disinfection Facility/Nashua, NH	Ongoing	Construction (if applicable) Currently under construction.
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE HVAC/Plumbing and Fire Protection lead designer. HVAC and plumbing design for a disinfection facility which uses sodium hypochlorite (NaOCl) bulk containers and 8% NaOCl solution. Dechlorination with sodium bisulfite (NaHSO3). HVAC ductwork and fans were all aluminum or coated steel construction, interlocked with motor actuated louvers. The electrical room was served via a wall mounted packaged AC unit and the general space heated by stainless steel unitary heaters. Plumbing consisted of emergency shower and eyewash stations coupled with a tempered water system in addition to a small restroom. HVAC and Plumbing Construction Cost: \$70,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	Clarksville WWTP Chemical Building and Overall Plant Improvements, City of Clarksville, TN.	Professional Services 2011-2015	Construction (if applicable) Construction substantial completion December 2014.
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE HVAC/Plumbing and Fire Protection lead designer. Design of plumbing, fire protection and HVAC systems for a chemical storage and feed facility for sodium hypochlorite (NaOCl) and calcium thiosulfate at the Clarksville WWTP. All equipment and materials were corrosion resistant. The entire building was protected by a wet pipe sprinkler system. Designed in multiple phases; 2011-2014. Currently under construction.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	Rivanna Pump Station and Interceptor Tunnel – Rivanna W&SA, Charlottesville, VA	Professional Services 2013	Construction (if applicable) Construction contract awarded Jan 2014
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE HVAC system design to ventilate a new pump station via a custom air handling unit with heat recovery utilizing a 48% efficient heat pipe. Unit construction was primarily stainless steel for corrosion protection with phenolic coatings on non stainless components. HVAC Construction Cost: \$715,000. Project design Year: 2013, construction start mid-2014.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	Difficult Run Raw Sewage Pump Station Rehabilitation – Fairfax County, VA	Professional Services 2014-2016	Construction (if applicable) Currently being bid.



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	<p>(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE</p> <p>HVAC design for wastewater pump station explosion hazard via ventilation per NFPA 820 standards to reduce buildup of harmful gas within both drywell side and wet well side of a pump station in the metro Washington DC area. This design included a custom rooftop air handling unit and FRP fan to ventilate the wet well side and a custom AHU with heat pipe heat recovery in the drywell side. Estimated HVAC construction cost: \$ 3.25 million.</p>	<p><input checked="" type="checkbox"/> Check if project performed with current firm</p>		
	<p>(1) TITLE AND LOCATION (<i>City and State</i>)</p> <p>Plum Island WPCP – Phase 3 Capital Improvements – Charleston, SC</p>	<p>(2) YEAR COMPLETED:</p> <table border="1"> <tr> <td data-bbox="945 495 1247 583">Professional Services Under current design 2014-2015</td> <td data-bbox="1247 495 1485 583">Construction (if applicable)</td> </tr> </table>	Professional Services Under current design 2014-2015	Construction (if applicable)
Professional Services Under current design 2014-2015	Construction (if applicable)			
5.	<p>(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE</p> <p>Replacement of entire plant chilled water systems, chillers plant and cooling tower and upgrades to all existing facilities HVAC systems to meet NFPA 820 and improved aging ventilation systems which are subject to severe environmental corrosion (both H2S and salt marsh marine environment). This is a large wastewater treatment plant located on Plum Island which serves all of the City of Charleston, SC. Estimated construction cost for HVAC Improvements: \$ 2.5 million.</p>	<p><input checked="" type="checkbox"/> Check if project performed with current firm</p>		



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4. Resumes of Key Personnel Proposed for this Contract (Complete one Section 4 for each key person.)

a. NAME Silvana Ghiu, Ph.D, P.E.	b. ROLE IN THIS CONTRACT Project Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 11	2. WITH CURRENT FIRM 1

d. LOCATION (City and State)
San Diego, CA

e. EDUCATION (DEGREE AND SPECIALIZATION)	f. PROFESSIONAL TRAINING - REGISTRATIONS
PhD Environmental Engineering, University of South Florida MS Environmental Science and Policy, Central European University, Hungary MS Atmospheric Physics, University of Bucharest, Romania BS Engineering Physics, University of Bucharest, Romania	Professional Engineer: California, Arizona

g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)

Professional Activities
Member of AMTA and IDA.

Selected Publications
Author of more than 32 presentations and publications

H. RELEVANT PROJECTS

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Disinfection Stability in Drinking Water Distribution System Manhattan Beach, CA	ONGOING	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE City of Manhattan Beach has experienced unstable disinfection residual in the distribution system. This study will assess the water quality of the source water and in the distribution as well as the blending strategy. A hydraulic model will investigate the age of water and a recommendation will be provided for improving residual. A sampling and analysis plan for blending facilities and distribution system will be delivered to the City along with recommendations on capital improvements and required permit amendments. ROLE: Project Manager COST: 55,000 USD	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	Groundwater Color Investigation Manhattan Beach, CA	2014	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE The City's two groundwater wells produce water with green tint which generates consumers complains and concerns. The projected developed a sampling and bench testing plan as well performed water quality analysis and bench scale chlorination and filtration. ROLE: Project Manager COST: 6,000 USD	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	Piloting, Treatment Process Evaluation and Preliminary Design (w/ Option for Final Design) Los Angeles, CA	ONGOING	
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE A new drinking water sources is considered by Cal Water from a groundwater well in East Los Angeles. A treatment system will be required to remove sulfides, methane, TOC, ammonia etc. A piloting treatment system will be developed and recommendations which will lead to recommendations and criteria for full size treatment plant at the well. ROLE: Project Manager COST: 226,000 USD	<input checked="" type="checkbox"/>	Check if project performed with current firm



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4.	(1) TITLE AND LOCATION (<i>City and State</i>) Reverse Osmosis System Performance Santa Monica, CA	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
	<p>Evaluated the RO system performance in terms of fouling, scaling and cleaning performance. Investigated RO membrane market for compatible membranes for replacement in the future, provided recommendations for system operation limits for entire RO system and individual stags and conducted site training for the staff/operators. ROLE: Project Engineer Cost: 20,000 USD</p>		
5.	(1) TITLE AND LOCATION (<i>City and State</i>) West Basin Ocean Water Desalination Demonstration Facility – Decommissioning Phase, Redondo Beach, CA	(2) YEAR COMPLETED	
		Professional Services ONGOING	Construction (if applicable)
	(3) BRIEF DESCRIPTION (<i>Brief scope, size, cost, etc.</i>) AND SPECIFIC ROLE	<input checked="" type="checkbox"/> Check if project performed with current firm	
	<p>The goal of this project was to remove the seawater reverse osmosis demonstration equipment and restore the area for continuous use at SeaLab facilities. Maximizing the cost recovery and minimizing the cost to West Basin Municipal Water District were emphasized. Role: Project Engineer COST: \$125,000</p>		



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5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION <i>(City and State)</i> Technical Support for City of Phoenix Water Demand Management Planning, Phoenix, Arizona	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES 2010	CONSTRUCTION <i>(If applicable)</i>

23. PROJECT OWNER'S INFORMATION

c. PROJECT OWNER City of Phoenix, Arizona	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT Original Fee: \$650,000	e. TOTAL COST OF PROJECT Total Fee: \$650,000
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

REFERENCE:

*Adam Q. Miller
 Planner III - Water Resources
 (602) 262-4575*

KEY TEAM MEMBERS:

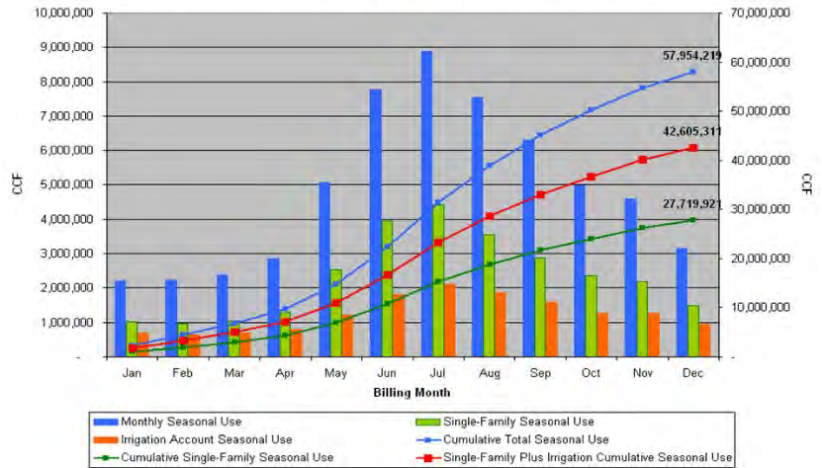
Jack Kiefer

The City of Phoenix Water Services Department is one of the largest municipal water providers in the southwestern United States, serving about 1.5 million water customers. The City retained Hazen and Sawyer to provide analytical support for the development of its Water Demand Management Plan. This support focused on both long-term water efficiency and water savings potential stemming from acute water shortages.

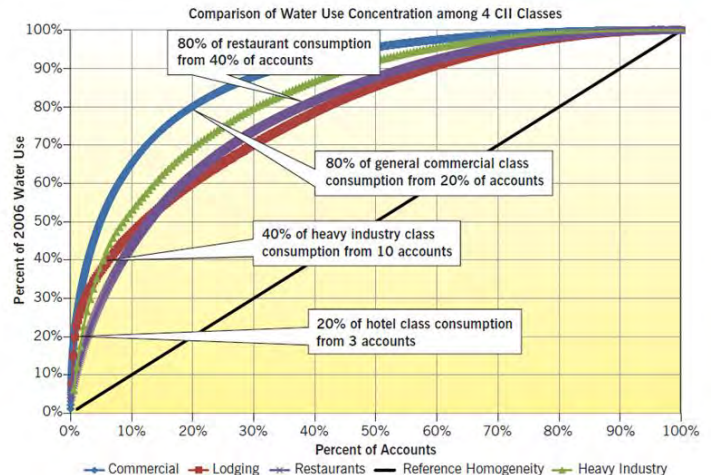
In support of the Plan, Hazen and Sawyer profiled water use trends among 34 type user classifications, focusing on time-series and cross-sectional analysis of variance in per account water use. Thirteen years of monthly consumption records were processed for over 400,000 customer accounts. The data supported water use analyses with respect to:

- Distributional analysis of average water use by sector by month and year, including percentiles and variance measures
- Identification and isolation of irrigation meter consumption to permit more flexible definitions of customers and estimation of outdoor use
- Time series and cross-sectional evaluation of outdoor/irrigation usage and the related potential for water savings from curtailing irrigation in specific sectors
- Seasonal variation due to weather fluctuations stemming from base climate and observed weather conditions, including regression models
- Evaluation of time trends in meter sizes and zero consumption meter readings
- Analysis of recent rate increases and estimates of price elasticity by season
- Examination of differences in price response among low and high water users
- Assessment of the concentration of water use among high users by water use sector, both inclusive and exclusive of dedicated irrigation meters
- Trends in customer preferences for grass landscaping and pool installation

Monthly and Cumulative Estimates of Seasonal Water Use Quantities 2006 (CCF)



Support to Water Services included comprehensive evaluations of seasonal use for the purposes of evaluating curtailment potential from watering restrictions should such acute conditions occur.



Profiling of commercial, industrial, and institutional water users included the development of concentration curves and identification of consistently high water users for specific customer segments.



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A multi-period distributional analysis procedure was developed to identify and sample large users for further analysis. The algorithm is capable of identifying consistently high water users in any particular customer class over any defined time period and was used to identify water efficiency potential, particularly in the nonresidential sector.

An important part of the project was the implementation of customer surveys to gather information that could help characterize trends in water use and to better define customers within given classifications. In collaboration with the City, survey instruments were developed and implemented for the General Commercial, Restaurant, Lodging, and Apartment sectors. In conjunction with matching customer water use information, the surveys identified end use, property, and operational characteristics that were highly correlated with trends in water use. A novel application of fuzzy logic was performed to support the identification and matching of customers and addresses across disparate databases, which were then used for survey implementation. Selected findings were presented at the national-level WaterSmart Innovations conference, including:

- Comprehensive Water Use and Customer Characterization for Efficiency and Shortage Planning (WaterSmart Innovations 2009)
- Implications of the Systematic Integration of Water Efficient Technology (WaterSmart Innovations 2010)



The analyses undertaken in support of Water Services by Hazen and Sawyer identified multiple factors leading to trends in water use.



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5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION <i>(City and State)</i>	b. YEAR COMPLETED	
Estrella Mountain Ranch Southern Solutions Water Supply Project, Goodyear, Arizona	PROFESSIONAL SERVICES 2014 (Preliminary Design)	CONSTRUCTION <i>(If applicable)</i>

23. PROJECT OWNER'S INFORMATION

c. PROJECT OWNER	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
Newland Communities, City of Goodyear, Arizona	Original Fee: \$55k Original Construction Cost: \$27.8 million (Estimated)	Total Fee: \$55,000, 100% Complete, on Budget (Preliminary Design) Total Construction Cost: 0% Complete, on Budget

g. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

Hazen and Sawyer has completed a feasibility study and preliminary design report for the Southern Solutions Water Supply Project to provide potable water to the Estrella Mountain Ranch Community within Goodyear, Arizona. The next phase of the project will include the design of a 2 MGD Reverse Osmosis system treating groundwater in southern Goodyear to remove nitrate, arsenic and fluoride. The project includes wellhead pumping stations, 7 miles of raw water and concentrate pipelines and a semi-enhanced evaporation pond system for managing the brine from the facility. The project includes permitting and assistance with coordination of City of Goodyear standards.

REFERENCE:

*Pete Teiche
Newland Project
Manager
602-468-0800*

*Bill Olson
Division Manager
602-618-9700*

KEY TEAM MEMBERS:

*Kevin Alexander
Troy Walker
Silvana Ghiu
Jacqueline Rhoades
Curt Courter*

Map of Estrella Mountain Ranch Area, Goodyear, Arizona





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5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION <i>(City and State)</i>	b. YEAR COMPLETED	
Chaparral Water Treatment Plant upgrades, Scottsdale, Arizona (Staff Personal Experience)	PROFESSIONAL SERVICES 2010-2014	CONSTRUCTION <i>(If applicable)</i> 2010-2014

23. PROJECT OWNER'S INFORMATION

c. PROJECT OWNER	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
City of Scottsdale	Original Fee: \$300K Original Construction Cost: \$5 Million	Total Fee: \$300K or 100% Complete, on Budget Total Construction Cost: 100% Complete, on Budget

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

The Chaparral Water Treatment Plant is a 30 MGD water treatment plant that utilizes coagulation and direct microfiltration (MF) followed by granular activated carbon (GAC) to treat surface water from the Salt River Project (SRP) canal system. Hazen and Sawyer staff (under previous employment), as part of a contractor and engineer team, assisted the City of Scottsdale in implementing several system upgrades to the Chaparral Water Treatment Plant. These have been completed through an ongoing Job Order Contract (JOC) service and are itemized below.

Low Pressure Air System Modifications – As part of a project to change the operation strategy of the existing MF system from “bleed and feed” “rapid drain”, current Hazen and Sawyer staff designed changes to the low pressure air system. The project included analyzing the existing blower system capacity and MF system demands while operating in rapid drain mode. In order to keep the existing blower equipment and operate the MF system in rapid drain mode, mechanical modifications were required. A blow off line was designed around the existing equipment to blow off excess air. Current Hazen and Sawyer staff developed the control strategy and assisted the membrane supplier with final programming.

Modified Control System Coordination – As part of a project to change the operation strategy of the existing MF system from “bleed and feed” “rapid drain”, current Hazen and Sawyer staff Alexander and Brad Reisinger developed a dynamic model for determining system hydraulic response. The model results were used to develop detailed control narratives and strategies to be implemented by the City programmers and GE into the final system. As part of the operation strategy change Mr. Reisinger performed a detailed coordination of modified control strategies for the membrane feed pump station, membrane rapid drain operation, wash water equalization basin, and chemical feed systems.

Backpulse and Compressed Air Modifications – Current Hazen and Sawyer staff performed multiple tasks to address mechanical maintenance issues with the backpulse system and to determine a solution for undersized Compressors. The effort included analyzing the microfiltration (MF) backwash system pressure surge condition, performing a hydraulic analysis and subsequent system redesign to eliminate surge. The redesign included a mechanical retrofit of the backpulse piping and pump station and a revised control strategy to correct water hammer in the system. Mr. Reisinger audited the plant compressed air system demands versus capacity to rectify the insufficient air supply issue. The supply issue was resolved by optimizing control set points and the control strategy as well as a simple redesign of the air removal vessels to allow for a venturi eductor system to provide vacuum air removal to optimize the air consumption. The project was a huge success eliminating the need for new and larger air compressors. The projects were completed as a design build project.

MF Basin Recoating – Current Hazen and Sawyer staff performed an evaluation of coating and lining systems to be used to rectify a problem with the delamination of the coating on all 10 of the original MF Basins. The project required a comprehensive selection process, a complete schedule strategy to allow the work to be done while keeping the water plant in operation, and a complete inspection and oversight of the installation to ensure the proper application of the coating system. The project was completed as a design build project.

Raw Water Pump Station Retrofit and Control Modifications - Project included the review of plant hydraulics and operations, development of a system dynamic model, inspection of four 10 mgd split case pumps in the factory, assistance during installation and performance testing. The project required that the controls be revised to eliminate cavitation and damage to the pump station. Current Hazen and Sawyer staff were responsible for hydraulic analysis, revised control strategy development, and final commissioning.

Operations Support Services – Current Hazen and Sawyer staff assisted city personnel with membrane integrity testing and membrane module replacement of their Zenon ZeeWeed 500 microfiltration system.

Operations Support Services – Project included an evaluation of possible causes and solutions for snail infestation in the microfiltration (MF) facility. Current Hazen and Sawyer staff developed complete plant hydraulic model to locate flow points with insufficient fluid velocity to keep particles in suspension. Hazen and Sawyer staff also coordinated strainer inspection with a factory service technician to verify strainer integrity and operation and then developed a revised automatic strainer maintenance schedule.

REFERENCE:
[Art Nunez](#)
[Water Reclamation Services Director](#)
[\(480\) 312-8724](#)

KEY TEAM MEMBERS:
[Kevin Alexander,](#)
[Project Manager at](#)
[Previous Firm](#)

[Buddy Boysen,](#)
[Project Engineer at](#)
[Previous Firm](#)

[Brad Reisinger,](#)
[Lead Designer at](#)
[Previous Firm](#)



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5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION <i>(City and State)</i> Water Campus Advanced Water Treatment Plant Phase IV Expansion, Scottsdale, Arizona (Staff Personal Experience)	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES 2009-2012	CONSTRUCTION <i>(If applicable)</i> 2010-2012

23. PROJECT OWNER'S INFORMATION

c. PROJECT OWNER City of Scottsdale	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT Original Fee: \$1.4M Original Construction Cost: \$27.4M	e. TOTAL COST OF PROJECT Total Fee: \$1.4M or 100% Complete, on Budget Total Construction Cost: 100% Complete, on Budget
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

The City of Scottsdale's Water Campus is a 20 MGD wastewater reclamation plant that treats to a Class A+ tertiary effluent for golf course irrigation. The plant has a 20 MGD advanced water treatment plant (AWTP) that further treats tertiary effluent for ground water recharge. The treatment consists of microfiltration, reverse osmosis, UV, decarbonation and lime stabilization. The phase IV expansion increased the capacity from 14 to 20 mgd and added UV to the process to control NDMA.

The detailed mechanical design of the MF and RO systems began in early 2009 and continued through 2010. Construction of the MF system began in early 2010 and continued through 2012.

Detailed design services included retrofitting a new 24 MGD microfiltration system into the existing MF building, expanding the capacity of the existing RO system by 7 MGD. This was accomplished with a first of its kind large diameter RO system that used a unique bidding process to select either the 16 inch or 18 inch RO system. The 16 inch system was selected during bidding. The large diameter RO had several design challenges including a new robust rack design to withstand the increased load and to prevent damage to the RO elements from sagging. In addition, the team developed a system that required RO manufacture to design a front facing brine seal allowing two directional withdrawal of the elements. This was a first of its kind. In addition the teamed worked with the RO manufacture to develop an element loading and unloading system to allow inserting and withdrawing elements from the same end of the vessels. Phase IV was constructed without taking the plant offline. The detailed mechanical design included the MF and RO systems as well as all the required ancillary systems such as chemical feed, high pressure compressed air, low pressure process air, chemical neutralization, and backwash recovery.

Current Hazen and Sawyer staff performed the following tasks:

1. Develop two complete MF system designs used for bidding
2. Compete P&ID drawing development
3. All mechanical lay-out and drawings
4. Develop MF system specifications
5. Develop RO system specifications
6. Developed complete 16 and 18 inch large diameter RO unit designs used in bidding
7. Provided engineering services during construction
8. Review Submittals and RFIs
9. Provided on-sight inspection
10. Develop complete control narrative and strategies
11. Developed electronic O&M manual
12. Delivered comprehensive training
13. Startup services

REFERENCE:

*Art Nunez
Water Reclamation
Services Director
(480) 312-8724*

KEY TEAM MEMBERS:

*Kevin Alexander,
Project Manager at
Previous Firm*

*Buddy Boysen,
Lead Designer at
Previous Firm*

*Brad Reisinger,
Lead Designer at
Previous Firm*



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(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION <i>(City and State)</i> Central Arizona Project (CAP) III water treatment plant expansion (Scottsdale, Arizona) (Staff Personal Experience)	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES 2007-2010	CONSTRUCTION <i>(If applicable)</i> 2008-2010

23. PROJECT OWNER'S INFORMATION

c. PROJECT OWNER City of Scottsdale	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT Original Fee: \$48 Million Original Construction Cost: \$44 Million	e. TOTAL COST OF PROJECT Total Fee: \$1.7 Million or 100% Complete, On Budget Total Construction Cost: 100% Complete, under Budget
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

The CAP WTP plant was originally constructed over 2 phases as a conventional flocculation sedimentation followed by media filtration that treated surface water from Central Arizona Project canal. The phase III expansion of the CAP WTP was introduced to increase the overall capacity by 20 MGD, taking it from 50 to 70 MGD. Due to limited available space, the plant III expansion utilized dissolved air flotation (DAF) as pretreatment to a 20 MGD Evoqua (previously Siemens) CP hollow fiber MF system. The phase III expansion also included a granular activated carbon (GAC) system sized to treat all 70 MGD. The project was delivered through a construction manager at risk contract.



The project included a comprehensive pilot test of both the pretreatment and MF systems and a comprehensive preliminary design with treatment alternatives selection in 2006. The detailed mechanical design of the MF system began in early 2007 and continued through early 2008. Construction of the water treatment plant began in early 2008 and continued through July 2010.

The design of the DAF and MF together as a comprehensive treatment process was a first of its kind in the US and Arizona. The design was the first large scale system greater than 3 MGD located in the United States that utilized the Evoqua CP microfiltration skid. As such, the design team worked closely with Evoqua to integrate their MF skids into the limited space. The detailed mechanical design included the primary MF system as well as all the required ancillary systems such as chemical feed, high pressure compressed air, low pressure process air, chemical neutralization, and backwash recovery. The MF system consists of five (5) Siemens CP MF units each with a 5 MGD capacity.

Current Hazen and Sawyer staff performed the following tasks:

1. Develop MF system procurement documents
2. Complete P&ID drawing development
3. Comprehensive mechanical layout and drawings
4. Develop MF system installation specifications
5. Complete engineering services during construction
6. Review Submittals and Contractor RFIs
7. Develop control narrative
8. Write the O&M manual
9. Comprehensive Training
10. On-sight Startup services
11. Process monitoring and optimization services during Correction Period

REFERENCE:

*Art Nunez
 Water Reclamation
 Services Director
 (480) 312-8724*

KEY TEAM MEMBERS:

*Kevin Alexander,
 Project Manager &
 Lead Designer at
 Previous Firm*

*Buddy Boysen,
 Lead Project Engineer
 at Previous Firm*

*Brad Reisinger,
 Lead Project Engineer
 at Previous Firm*



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6. ADDITIONAL INFORMATION

a. PROVIDE ANY ADDITIONAL INFORMATION YOU FEEL MAY BE NECESSARY TO DESCRIBE YOUR FIRMS QUALIFICATIONS. (ATTACH ADDITIONAL SHEETS AS NEEDED.)

Additional information has been attached to this submittal.

7. ANNUAL AVERAGE PROFESSIONAL SERVICES REVENUES OF FIRM FOR LAST 3 YEARS

a.	Percentage of Total Work Attributable to State, Federal and Municipal Government Work:	98%
b.	Percentage of Total Work Attributable to Non-Government Work:	2%

8. AUTHORIZED REPRESENTATIVE. The foregoing is a statement of facts.

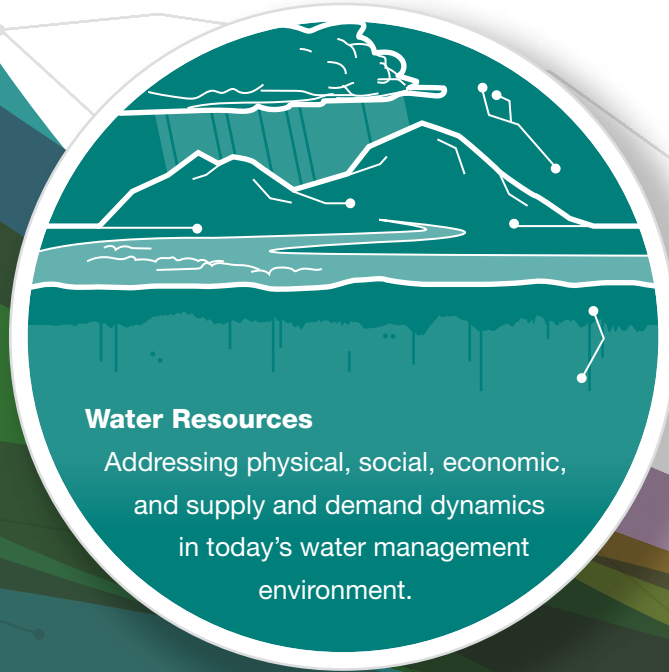
Signature:

Date: December 19, 2014

Name: Kevin Alexander, PE

Title: Vice President

Experts in All things water



Water Resources
Addressing physical, social, economic, and supply and demand dynamics in today's water management environment.

Applied Research
Advancing environmental engineering science, from designing new technology to influencing regulations.

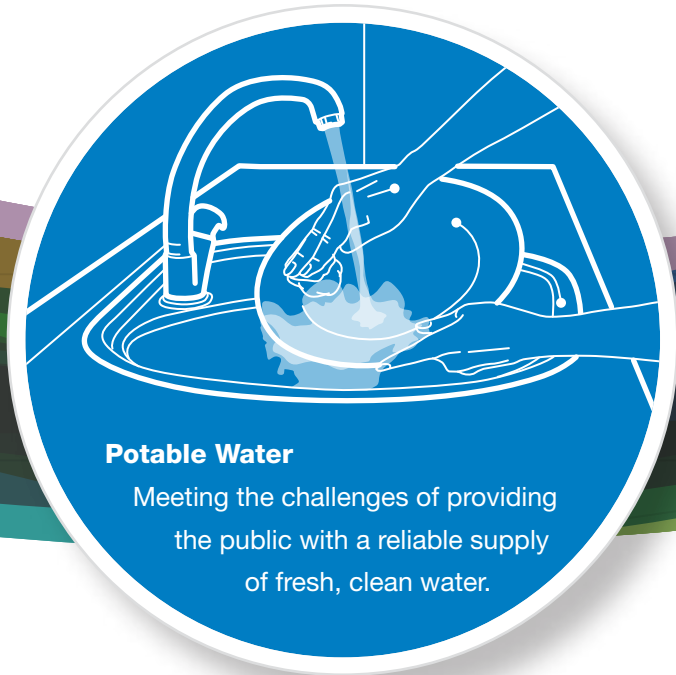



Water Reuse
Providing sustainable solutions using technology and processes to maximize water resources and reduce energy footprint.



Wastewater
Helping wastewater and resource recovery facilities achieve required levels of treatment and plan strategically for the future.

Conveyance
Design the pumps, pipes, and sewers that convey wastewater and distribute potable water.

Potable Water
Meeting the challenges of providing the public with a reliable supply of fresh, clean water.



Discharge/Wet Weather
Managing impacts on sewer and drainage infrastructure and the health of water resources downstream.

Construction and Program Management
Managing implementation of complex facilities and programs to maintain budgets and schedules with a priority, solution based approach.



We are industry experts solving our client's toughest challenges, harnessing decades of experience and research

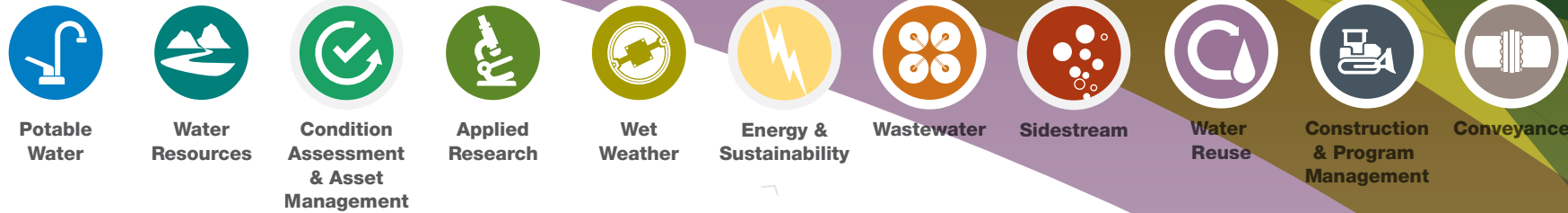
Leading the industry forward from advancing environmental engineering science and designing new technology to influencing regulations.

When a project is finished our work continues in managing performance, optimizing systems and training operators.

Condition Assessment and Asset Management
Managing infrastructure capital assets to minimize total life cycle costs through prioritized and phased asset management.

Energy and Sustainability
Developing sustainable solutions to reduce costs, generate revenue, eliminate waste, and improve the environment.

Sidestream Treatment
Advancing technology to reduce operating costs through nutrient recovery and ease the strain on the liquid treatment train.



HAZEN AND SAWYER

Environmental Engineers & Scientists

Project Experience

PROJECT

Wastewater Reuse Uconn Central Utilities Plant
Storrs, CT



SIZE/COMPLEXITY

Constructed 1 MGD wastewater reuse facility to treat secondary effluent from their wastewater plant. The reclaimed water is used for non-potable water uses at the Central Utility Plant (CUP) and turf irrigation.

CONTACTS

Mr. Timothy Tussing
Assistant Director, Utility Services
University of Connecticut
25 LeDoyt Road
Storrs, CT 06269
(860) 486-2608
timothy.tussing@uconn.edu

Indirect Potable Reuse Pilot Test
Hollywood, FL



Pilot of MF, Ion Exchange, UV/AOP, Ozone, and BAC to develop the permitting requirements for full-scale implementation of this IPR scheme.

Steve Joseph, P.E.
Director of Public Utilities
City of Hollywood
P.O. Box 229045
Hollywood, FL 33022
(954) 967-4455
sjoseph@hollywoodfl.org

Groundwater Replenishment System
Fountain Valley, CA



Utilize MF, RO, and UVAOP to treat nitrified wastewater effluent for injection into a seawater intrusion barrier and for percolation into a drinking water aquifer for 100 MGD Indirect Potable Reuse Facility

Mehul Patel, P.E.
Program Manager
Orange County Water District
18700 Ward St.
Fountain Valley, CA 92708
(714) 378-8209
mpatel@ocwd.com

Regional Reuse Master Plan
Broward County, FL



Prepared a Regional Reuse Master Plan for reclaimed water infrastructure throughout Broward County. The County includes 28 separate municipalities and 14 wastewater treatment plants. The Master Plan is aimed at identifying the maximum potential for reclaimed water usage throughout the County.

Jennifer L. Jurado, Ph.D., Director
Natural Resources Planning and Management Division
Broward County
115 South Andrews Avenue #329-H
Fort Lauderdale, FL 33301
(954) 519-1464

Water Reuse Research Foundation



Leading four reuse focused projects, including two operationally focused projects, WRRF 13-03 investigating the use of the critical control point methodology for direct potable reuse (DPR) and WRRF 13-13 developing an operations training and certification framework for DPR. We are collaborating with numerous utilities nationally, including the City of Scottsdale, AZ.

Julie Minton
Research Program Director
WaterReuse Research Foundation
1199 North Fairfax Street, Suite 410
Alexandria, VA 22314
(703) 548-0880
jminton@watereuse.org



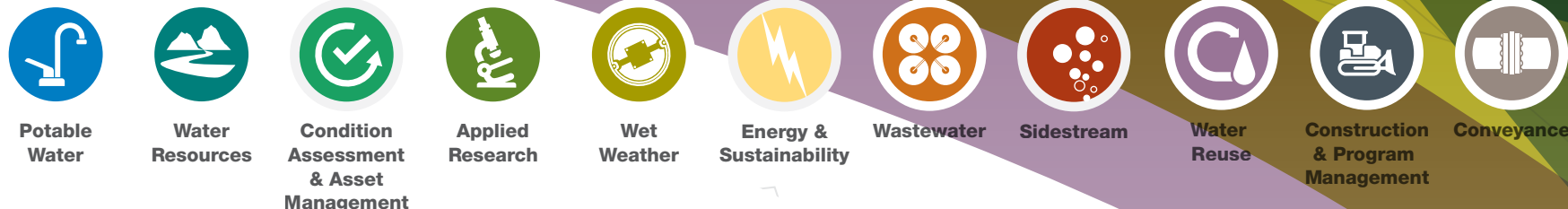
Water Reuse

Hazen and Sawyer has been leading the industry in water reuse since the 1951, starting with Defacto Reuse to help our customers treat water for safe use and recover it for the next customer down stream.

Hazen and Sawyer was one of the first companies in Florida to design a recycled water treatment plant for turf irrigation and has planned and designed dozens since that time. In Arizona, our staff have been instrumental in the development and expansion of the landmark Scottsdale Water Campus as well as reclamation facilities in Chandler, Florence, and elsewhere.

From recycling for irrigation to direct potable reuse, Hazen and Sawyer has assembled a team with the widest backgrounds in Reuse, from here in the USA and around the world, to address today's challenges with Recycled Water.





HAZEN AND SAWYER

Environmental Engineers & Scientists

Project Experience

PROJECT

Southern Solutions Water Supply Project
Goodyear, AZ



SIZE/COMPLEXITY

Treatment technology evaluation, preliminary design, and cost estimating for a 2 MGD brackish groundwater treatment facility for arsenic, fluoride, nitrate, and TDS.

CONTACTS

Pete Teiche
Project Manager
Newland Communities
4050 N. 40th St. Suite 2010
Phoenix, AZ 85016
(602) 468-0800
pteiche@newlandco.com

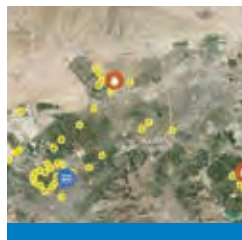
Charnock and Arcadia Groundwater Treatment Facilities
City of Santa Monica, CA



Operations support to optimize and solve RO membrane fouling issues at a 10 MGD groundwater RO system for treating 1,4-dioxane and TDS.

Myriam Cardenas
Plant Superintendent
City of Santa Monica
1228 S. Bundy Dr.
Los Angeles, CA 90025
(310) 434-2659
myriam.cardenas@smgov.net

Domestic Source of Supply/Treatment Study
Coachella Valley Water District, CA



Domestic source of supply treatment study for solving Chromium-6 challenges in the groundwater. Study of treatment technologies and evaluation of alternative supply strategies.

Steve Bigley
Director of Environmental Services
Coachella Valley Water District
75515 Hovley Lane East
Palm Desert, CA 92211
(760) 398-2651
sbigley@cvwd.org

Southern California District Treatment Evaluation
Los Angeles, CA



Evaluated treatment options for a new well. The evaluation included assembly of treatment trains including aeration, coagulation, filtration, nanofiltration, ozone and ferrate oxidant.

Jackie Takeda
Water Quality Project Manager
California Water Service Company
2632 W. 237th Street
Torrance, CA 90505
(310) 257-1482

Chromium-6 Removal from SFB Groundwater
City of Glendale, CA



Technical manager and Owner's Agent of complex planning, Design-Build, and oversight of operations for the first two municipal Chromium-6 treatment facilities.

Ramon Abueg, Chief Assistant General Manager
City of Glendale
141 N. Glendale Ave., 4th Floor
Glendale, CA 91206
(818) 548-2138
rabueg@ci.glendale.ca.us

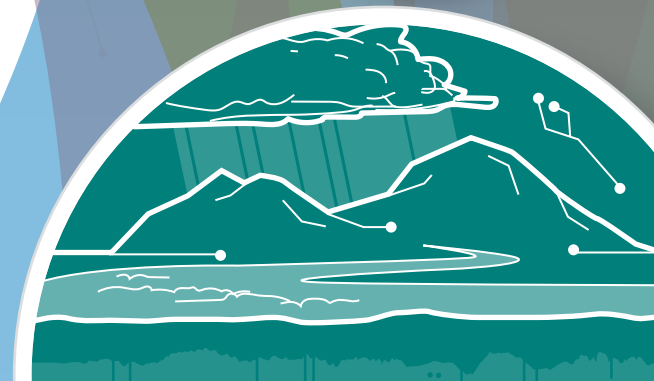


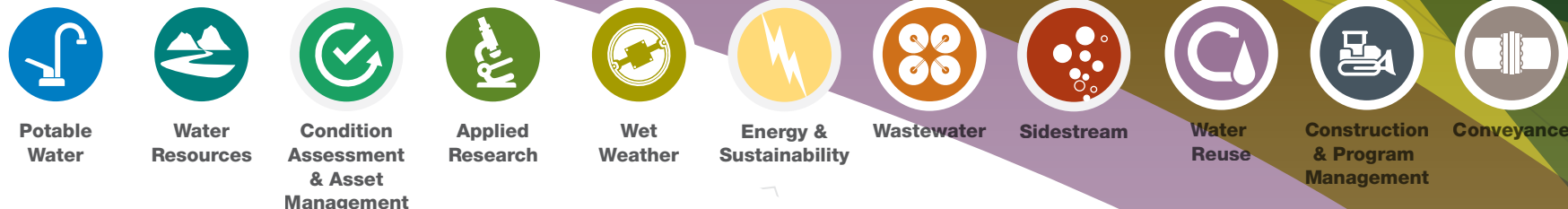
Potable Water

We can assist you in meeting current and future regulations, treat challenging ground and surface waters, prioritize infrastructure upgrades, evaluate disinfection options, and manage your supply.

Maintaining a reliable drinking water supply can present a steady stream of challenges to providers. Some utilities struggle to keep up with population growth, while others seek to maintain existing infrastructure as water demands (and revenues) decline. Progressively stringent regulations, emerging contaminants, and a public that is more concerned about water quality than ever before complicate matters further. Our engineers and scientists include top researchers whose work identifies innovative treatment methods, operations methodologies and tools, and hydraulic modeling techniques – bolstering the expertise and big-picture vision we bring to even the smallest project.

We're helping to shape the future of water, and we can prepare you for it.





HAZEN AND SAWYER

Environmental Engineers & Scientists

Project Experience

PROJECT

East Bay Municipal Util. Dist. MWWTP Struvite Control Investigation
Oakland, CA



SIZE/COMPLEXITY

Evaluation to improve the overall dewatering process functionality and establish controls to address struvite related process restrictions at the MWWTP by developing near- and long-term strategies for struvite mitigation.

CONTACTS

Dave Freitas
Wastewater Treatment Superintendent
PO Box 24055, MS #59
Oakland, CA 94623
510-287-1502
dfreitas@ebmud.com

Fort Worth Village Creek WRF Gravity Belt Thickener Addition
Fort Worth, TX



Evaluation and design for addition of a third gravity belt thickener (GBT). Evaluated sludge production rates, chemical usage and GBT thickening alternatives to accommodate the WAS and HRC sludge thickening. Project includes design and construction phase services for the addition of the third GBT and new polymer blending units.

Andrew Cronberg, PE
Assistant Director
Fort Worth Water Department
1000 Throckmorton Street
Fort Worth, TX 76102
817-392-5020 / 817-392-8195
Andy.cronberg@fortworthtexas.gov

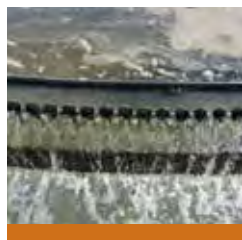
Southeast and Oceanside WWTP Optimization Study
San Francisco, CA



Updated BioWin™ biological process models at both of the plants to evaluate potential process changes and to optimize the overall process trains. Performed field testing, sampling, dye testing, and analysis and modeled "what-if" scenarios based on anticipated future regulatory conditions.

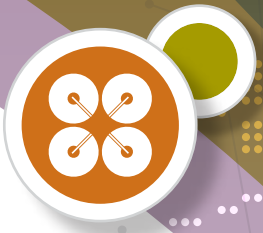
Meei-Lih Ahmad
San Francisco Public Utilities Wastewater Enterprise
750 Phelps Street
San Francisco, CA 94124
415-920-4913
mahmad@sfgwater.org

Southeast WWTP Secondary Clarifier Upgrade Evaluation
San Francisco, CA



Preliminary design review and assessment of the secondary clarifier upgrades at the 85 mgd Southeast WWTP. Developed a Computational Fluid Dynamics (CFD) Model of the secondary clarifiers to evaluate potential upgrades. Performed extensive stress testing and field sampling.

Meei-Lih Ahmad
San Francisco Public Utilities Wastewater Enterprise
750 Phelps Street
San Francisco, CA 94124
415-920-4913
mahmad@sfgwater.org



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Wastewater

We specialize in helping wastewater and water resource recovery facilities achieve required levels of treatment, reduce their environmental footprint, and plan strategically for the future. This clarity of focus – combined with our decades of experience – means that we regularly find ourselves faced with some of the world's greatest planning, design, construction and program management challenges. The opportunity to face these challenges brings many of the most qualified wastewater engineers and operations specialists to our employ. Our people relish developing simple, smart, forward-thinking solutions to address the needs of our clients. Our work is most often characterized by the superior technical expertise we provide clients to achieve their water quality goals.



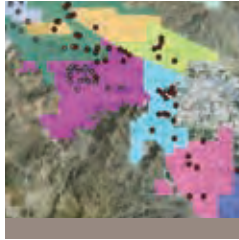





HAZEN AND SAWYER

Environmental Engineers & Scientists

Project Experience

PROJECT	SIZE/COMPLEXITY	CONTACTS
Southern Solutions Water Supply Project Newland Communities, Goodyear, AZ 	Evaluated routing alternatives for seven miles of raw water and concentrate pipelines for delivering 2 MGD of groundwater from new well fields to a new RO treatment facility and concentrate to a semi-enhanced evaporation pond system.	Mr. Pete Teiche 602-468-0800 pteiche@newlandco.com
Water and Wastewater Main Replacement Design Dallas Water Utilities, TX 	Design of 11,840 LF 48", 600 LF of 24", and 7610 LF of 6"-12" water lines and 11475 LF of 33"-36" and 7650 LF 6" - 12" wastewater collection pipe, in an urban area including creek crossings, a light rail crossing, and interstate highway crossing.	Rishi Bhattarai, PE Project Manager Pipeline Project Management Dallas Water Utilities 2121 Main Street, Suite 300 Dallas, TX 75201 (214) 671-9183 rishi.bhattarai@dallascityhall.com
Coachella Valley Colorado River Supply Pipeline Routing Study Coachella Valley Water District, CA 	Evaluating alignment alternatives for a 60" to 84" raw water line from the Coachella Canal to a groundwater recharge facility. Includes identifying pumping requirements and construction methods.	Jeff Hart (760) 398-2661 x 2737
Sanitary Sewer Rehabilitation Contract #90 City of Fort Worth, TX 	Design for rehabilitation or replacement of approximately 12,800 LF of 8" sanitary sewer lines utilizing open cut, pipe bursting or cured-in-place liner in urban areas.	Tony Sholola, PE City of Fort Worth Engineering Manager 1000 Throckmorton Street Fort Worth, TX 76102 (817) 392-6054 Tony.Sholola@fortworthtexas.gov



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New York Headquarters

Conveyance

Whether assessing and rehabilitating existing assets or building new assets, we combine top technical know-how with innovative, informed, responsive service on conveyance projects of all scopes and sizes.

We specialize in a variety of construction methods, including HDD, microtunneling, jack and bore and other trenchless techniques.

Hazen and Sawyer's extensive buried infrastructure capabilities are complemented by our award winning pump station design and construction management solutions, which have provided immediate operational benefits and long-term cost savings to clients nationwide.

Hazen and Sawyer specializes in assessing systems and developing an economical, integrated strategy to target dollars where they are needed most, ensuring your buried assets are optimized to support your community.





Potable Water Water Resources Condition Assessment & Asset Management Applied Research Wet Weather Energy & Sustainability Wastewater Sidestream Water Reuse Construction & Program Management Conveyance

HAZEN AND SAWYER

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Project Experience

PROJECT

Village Creek WWTP and Valley Creek WWTP Energy and Process Optimization Study

Jefferson County, AL



SIZE/COMPLEXITY

Identified energy management projects to reduce operating costs for each plant (120 MGD total capacity). Business-case evaluations identified approximately \$11M in optimization-related improvements. Implementation is expected to result in over \$2M annual operational cost savings, many for little or no upfront cost.

CONTACTS

Daniel White, PE
Deputy Director
Jefferson County
Department of Environmental Services
716 Richard Arrington, Jr., Blvd. N.
Suite A-300
Birmingham, AL 35203
(205) 214-8610

North and South Durham WRF's

City of Durham, NC

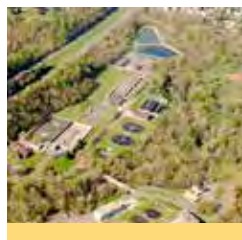


Developed a 20-year wastewater treatment and energy management master plan for the North and South Water Reclamation Facilities to reduce energy usage and cost, and maximize the usage of renewable energy resources for each plant. Our work identified that up to 25% annual energy savings could be realized.

Donald F. Greeley, PE
Director of Public Works
City of Durham Department of Water Management
101 City Hall Plaza
Durham, NC 27701
(919) 560-4326

Moore's Creek WWTP

Rivanna Water and Sewer Authority, VA



Designed upgraded treatment facilities for enhanced nutrient removal (ENR) at the 15-mgd Moore's Creek WWTP. Included an evaluation of energy efficiency benefits from replacing the plant's engine driven blowers with new electric high speed turbo blowers and using excess digester gas to generate electricity and offset the purchased power source.

Dr. Robert C. Wichser, PhD, P.E.
Director, Water and Wastewater
Rivanna Water and Sewer Authority
695 Moore's Creek Lane
Charlottesville, VA 22902-9016
434-977-2970

Energy Management Plan Development

Sanitation District No. 1 of Northern Kentucky



Developed energy management plans (EMPs) for the 34 MGD Dry Creek WWTP, the 12 MGD Western Regional WRF, and the 8 MGD Eastern Regional WRF. Identified alternative utility power rate structure to save \$100,000 per year, as well as several no cost and low cost/short payback opportunities.

Mr. Chris Novak
Deputy Executive Director
Operations
Sanitation District No. 1 of N. KY
1045 Eaton Dr.
Ft. Wright, KY 41014
(859) 578-6885

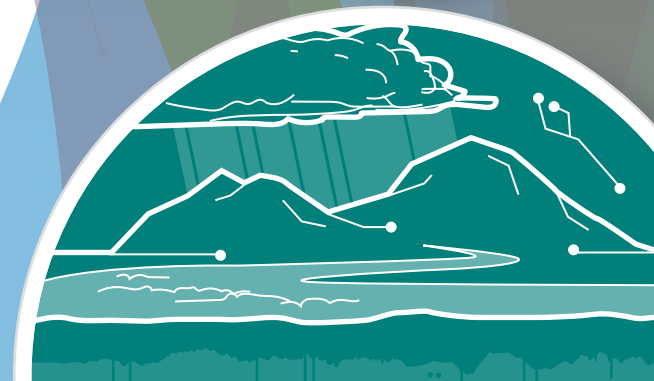


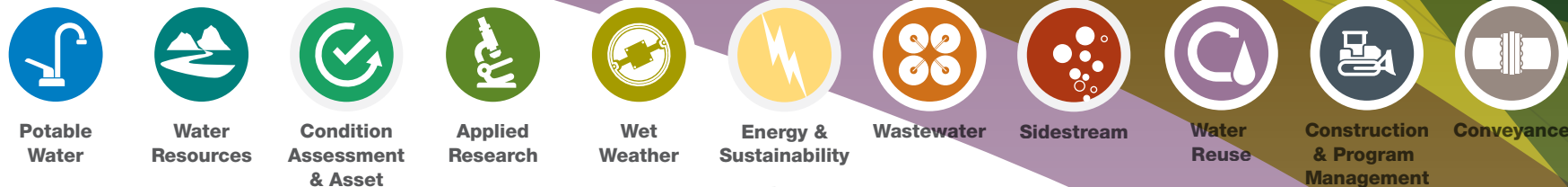
Energy and Sustainability

We specialize in evaluating and implementing energy procurement alternatives, demand management opportunities and electric unit rate alternatives that can often be executed at zero or very low cost. We are also industry leaders at treatment process modeling, facility design and operation. Applying this expertise to treatment plants, in conjunction with our innovative energy assessment tool, HEET, allows process and energy optimization measures to be developed and assessed simultaneously.

HEET is a predictive diagnostic tool that tracks energy consumption at each point in the treatment process, and when used in conjunction with BioWin™ or GPS-X™, the tool provides the added value of simultaneous assessment of process operations and energy audits. From Envision, LEED and LID to reuse and waste-to-energy programs, we have sustainable solutions to optimize your project.

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HAZEN AND SAWYER

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Project Experience

PROJECT

Water and Wastewater System Asset Management Plan Update
Palm Beach County Water Utilities, FL



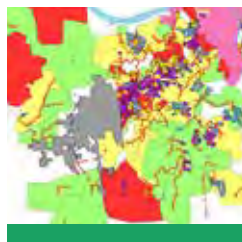
SIZE/COMPLEXITY

Evaluated vertical (discrete) water and wastewater assets using Hazen and Sawyer's Asset Management & Decision Support (AMDS) tool to set up asset registries, compile and input condition assessment and criticality data, and perform risk analysis to identify and prioritize assets at highest risk.

CONTACTS

Nancy Gallinaro
Director of Strategic Planning
8100 Forest Hill Blvd.
West Palm Beach, FL 33413

Continuous Sewer Assessment Program
Sanitation District No. 1 of Northern Kentucky



Developed SSES, preventative O&M, sewer assessment, trouble call, and manhole assessment and rehabilitation programs. Included detailed decision making procedures incorporated into an automated MS Access software tool for identifying required inspection and cleaning frequencies based on condition and criticality.

Mark Wurschmidt, PE, BCEE
Deputy Executive Director, Engineering
(859) 578-6762
mwurschmidt@sd1.org

Trunk Sewer Inspections and Surveying
Washington Suburban Sanitary Commission, Multiple Sites, MD



Inspecting sewers 15-inches in diameter and larger as well as 4,000 manholes in four different sewer basins using NASSCO PACP and MACP. Developed and maintained large databases to store report and QA/QC data collected during the project. Prepared detailed designs and specifications for manhole and pipeline repair, stream and embankment stabilization and exposed pipe and manhole protection.

Glen Diaz
Unit Coordinator
(301) 206-4378

Bay Park STP and Cedar Creek WPC Plant AMDS
Nassau County, NY



Conducted an asset management assessment of two 72 MGD wastewater treatment facilities, including onsite power generation facilities, influent and effluent pumping stations, screening, aerated grit removal, primary clarification, anaerobic digestion, belt press thickening and dewatering, hypochlorite chlorination and dechlorination.

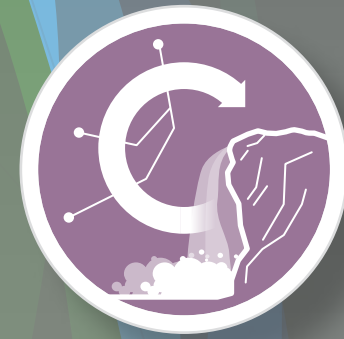
Joseph L. Davenport, PE
Director
Nassau County
Building R – 3rd Floor
3340 Merrick Road
Wantagh, NY 11793
(516) 571-9608

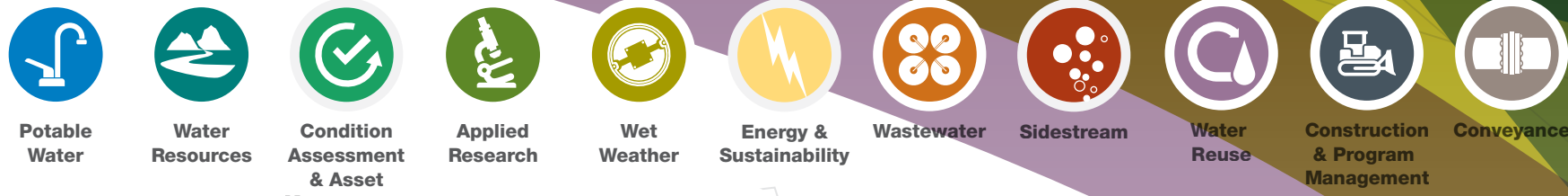


Condition Assessment and Asset Management

Hazen and Sawyer provides expertise, tools, technologies and procedures that empower our clients to achieve excellence in asset management. We have helped numerous utilities successfully perform condition assessment and develop tailored, flexible, risk-based asset management programs to support prioritized decision-making. We bring a comprehensive understanding of water and wastewater system design, operation, maintenance and rehabilitation that we leverage through the use of state of the art software decision support tools, including many that are developed in-house and are given to clients to further refine their Asset Management Programs.

We can also leverage commercially available software systems such as Maximo, CITYWorks, and LuCITY to support critical Asset Management decisions.





HAZEN AND SAWYER

Environmental Engineers & Scientists

Project Experience

PROJECT

Nansemond Treatment Plant

Hampton Roads Sanitation District, VA



SIZE/COMPLEXITY

Designed sidestream treatment of centrate using the Ostara process for the 30-mgd Nansemond WWTP. Process has been in operation for over four years and consistently removes 85-90 percent of orthophosphate from centrate and 20 percent of influent ammonia.

CONTACTS

Mr. William Balzer, PE
Hampton Roads Sanitation District
Nansemond Plant Manager
6909 Armstead Road
Suffolk, VA 23435
(767) 638-7361

Fort Wayne Hill WRC Plant Upgrade

Gwinnett County, GA

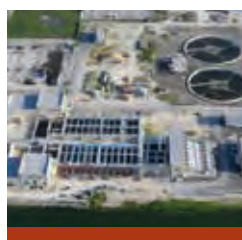


Designed nutrient removal via the WASSTRIP and Ostara processes to address struvite problems and Phosphorus recycle at the 60 mgd F. Wayne Hill WRC. Included pilot testing, BioWin modeling, and business case evaluation to address Phosphorus in recycle streams and struvite reduction.

Richard Schoeck, PE
Division Director of Engineering & Construction, Gwinnett County
Dept. of Water Resources
684 Winder Highway
Lawrenceville, GA 30045
(678) 376-6953

Central/South District WWTP

Miami-Dade, FL



Developed solutions to address struvite formation in the digester and dewatering facilities of the 116 MGD Central and 100 MGD South WWTPs. Assessment included modeling to show propensity for struvite formation alternative strategies. In-situ coupon testing was used to evaluate the success of the control strategies.

James B. Ferguson, PE
Miami-Dade Water and Sewer Department
(786) 268-5250

North and South Durham WRF's

City of Durham, NC



Evaluated sidestream treatment alternatives including struvite recovery for phosphorus removal for both of the 20 mgd WWTPs. The paybacks for the struvite recovery facilities ranged from 5 to 25 years depending upon technology provider and sidestream load, which varied by plant.

Vicki Westbrook
City of Durham
(919) 560-4381 ext. 35266

Newtown Creek WWTP Struvite Control

New York, NY



Evaluated struvite control strategies and used in-situ coupons to monitor struvite build up at NYC's 310 mgd Newtown Creek WWTP. Developed minimum CO2 dosing requirements to eliminate nuisance struvite formation during sludge dewatering. Utilized BioWin and Visual Minteq software to resolve requirements.

Mr. Michael Borsykowsky, P.E.
Assistant Commissioner, Engineering Management
NYCDEP
96-05 Horace Harding Expressway
Corona, NY 11368
(718) 595-5921



Sidestream

Hazen and Sawyer leads the industry in designing nutrient recovery systems. We implemented the second working Ostara Pearl® Process in the United States and have since performed pilot testing and economic evaluations at many municipal facilities with a second facility under construction.

Hazen and Sawyer is committed to investigating the recovery of resources from wastewater and biosolids. We were chosen to lead the Water Environment Research Foundation Nutrient Recovery Challenge, a project to develop a guidance tool to help utilities evaluate nutrient recovery with a focus on phosphorus recovery.



Kevin Alexander, PE

Vice President



Areas of Expertise

- Project Management
- Project Delivery
- Microfiltration
- Reverse Osmosis
- Drinking Water
- Wastewater
- Water Reclamation
- Concentrate Treatment

Professional Record

Mr. Alexander serves as Hazen and Sawyer's West Regional Manager. He has extensive experience in the planning, design and construction of advanced water, wastewater and water reclamation facilities. His assignments have included providing technical review and assistance

on cutting edge research projects using advanced treatment technologies. He has led the pilot and demonstration testing of advanced treatment processes including Ozone, MF, RO, and concentrate treatment. He has

developed procurement documents for over 30 MF, RO and MBR systems and assisted many agencies with negotiations with technology manufacturers. He has led feasibility/planning studies, developed treatment process evaluations and life-cycle cost evaluations, participated in value engineering studies and operations evaluations. He has developed detailed designs of many systems and provided construction and startup services. He has experience with many different project delivery methods including: design-bid-build, CM at risk, alliance contracting, design-build and design-build-operate.

- **Newland Communities Southern Solution Water Treatment Evaluation and Design, Goodyear, Arizona, Principal and Project Manager:** The project focuses on treating TDS, nitrate, arsenic and fluoride from a local groundwater with activated alumina or reverse osmosis. The project included a feasibility study and design of a 2 MGD RO system including enhanced brine disposal ponds. In addition to the project design, the project includes procurement, permitting and coordination with City of Goodyear standards and operations.
- **City of Scottsdale, CAP Water Plant Expansion, Scottsdale, Arizona (August 2005 – March 2011), Project Manager:** Prepared detailed mechanical process design of a membrane system for a 20-mgd Central Arizona Project (CAP) Water Treatment Plant Expansion. Responsible for developing and implementing the membrane system pilot testing and for developing membrane procurement documents. Prepared the detailed

Mr. Alexander has extensive experience in the planning, design, and construction of RO treatment facilities.

Academic Credentials

BS University of Missouri, Civil Engineering, 1994

Civil Engineer: Arizona, California, Florida, Idaho, Oklahoma, Texas, Washington, NCEES

Employment Record

2013-Pres. Hazen and Sawyer, P.C.

1999-2013 Separation Processes, Inc.

1995-1999 Black & Veatch

Professional Activities

American Water Works Association

AZWA

American Membrane Technology Association

CA-NV AWWA

CA Water Reuse Association

WaterReuse Association

Water Environment Federation

Technical Publications

WaterReuse Foundation Tailored Collaboration (2013): "Demonstrating an Innovative Combination of Ion Exchange Pretreatment and Electrodialysis Reversal for Reclaimed Water Reverse Osmosis Concentrate Minimization", Project Participant and Author

WaterReuse Foundation Tailored Collaboration (2012): "Pilot-Scale Oxidative Technologies for Reducing Fouling Potential in Water Reuse and Drinking Water Treatment Membrane Systems" Project Participant and Technical Advisory Team Member

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design of the membrane system and complete membrane facility under a CM at Risk project.

- **City Of Scottsdale, Chaparral Water Plant – Raw Water Pump Station Retrofit and Control Modifications Scottsdale, Arizona (June 2012 – November 2012), Project Manager:** Project includes review of plant hydraulics and operations review, inspection of 4 x 10-mgd split case pumps in the factory, assistance during installation and performance testing. The project required that the controls be revised to eliminate cavitation and damage to the pump station. Responsible for hydraulic analysis and final control and commissioning.
- **City Of Scottsdale, Chaparral Water Plant – Backpulse and Compressed Air Modifications, Scottsdale, Arizona (August 2011 – September 2012), Project Manager:** Project includes design of a revised backpulse piping and pump station to correct water hammer in the system. The project included revising the air removal vessels to allow for venture educator system to provide vacuum air removal to optimize the air consumption and eliminate the need for larger air compressors. The project was completed as a design build project.
- **City Of Scottsdale, Chaparral Water Plant:** Snail Evaluation, Scottsdale, Arizona (August 2008 – March 2009), Quality Control Manager: Project includes 29-mgd surface water MF system using direct coagulation with iron salts to remove arsenic followed by granular activated carbon for taste and odor and TOC removal. Responsible for review of pipe design modifications and assisting with review of options for ensuring snails and snail eggs are removed prior to the membrane system.
- **Arizona American Water Company (previously Citizens Water Resources) Anthem Water Campus:** Phase 2, 3 and 4 Water Plant Expansions, Anthem, Arizona (June 1999 – July 2003), Project Manager: Assisted in the design, construction and startup of a 4-mgd UF membrane plant and 1.67-mgd temporary UF membrane plant. Assisted in preparing plans and specifications for the 4-mgd WTP expansion general contract to treat CAP Canal Water for potable use. Assisted in the review and proposal evaluation for the Phase 2: 2-mgd expansion of the system.
- **Arizona American Water Company (previously Citizens Water Resources), Anthem Water Campus – Influent Pump Station Hydraulics Evaluation and Piping Modifications, Anthem, Arizona (June 2001 – July 2003), Project Manager:** The 7-mgd WTP raw water pumps were not pumping correctly. The project was carried out to determine the cause and recommend revisions to the system to alleviate the problem. Responsible for detailed hydraulic analysis including a multiple reservoir analysis of the raw water reservoirs and pump stations pumping to a small membrane system with limited equalization. Ultimate solution was determined to be adding control valves and orifice plates to balance the head loss in the system.
- **City Of Scottsdale, Water Campus Phase 1 and 2:** MCAP Treatment System, Scottsdale, Arizona (1995-1999), Project Engineer for Black & Veatch: Prepared plans and specifications for a 5-mgd Central Arizona

WaterReuse Foundation
Tailored Collaboration(2011):
“Comparing Conventional
and Pelletized Lime Softening
Concentrate Chemical
Stabilization” Project
Participant, Author, Reviewer

Kevin Alexander, October 11,
2012 CA-NV Fall Conference:
“Start-Up of the Scottsdale
Water Campus Large Diameter
RO System”

Kevin Alexander, October 11, 2012
CA-NV Fall Conference: “Squeezing
Every Drop of Water from the Expanded
Leo J. Vander Lans Water Treatment
Facility”

Kevin Alexander, July 2010, July 2011
and August 2012 Nevada WWET
Operator Forum and Training, “The
Complete Guide to Reverse Osmosis,
Membrane Filtration and Membrane
Bioreactors”

Kevin Alexander, Mark Gross, Charlie
He, Raghu Nandan, AWWA MTC 2009,
“High Recovery Membrane System Pilot
for the City of Phoenix Western Canal
Water Treatment Plant”. Conference
Proceedings

Kevin Alexander, July 2008 AMTA-
NWRI MBR Workshop, “Membrane
Bioreactor Procurement”

Amlan Ghosh, Art Nunez, Laurel
Passantino, Kevin Alexander, Zaid
Chowdhury, November 2006.
Innovative Processes for Scottsdale’s
Future: Selection of Pre-treatment
for Membrane Filtration. In AWWA
Water Quality Technology Conference
Proceedings.

Thomas Pankratz, Dawn Guendert,
Kevin Alexander. October 2003.
Comparing MF/RO Performance on
Secondary and Tertiary Effluents in
Reclamation/Reuse Applications. In the
International Desalination Association
Conference Proceedings.

Kevin Alexander, William Vernon,
Jim Clune May 2003, MF and RO
Membrane Replacement Costs and
Considerations for the City of Scottsdale

Project canal water filtration system using membrane filtration. The system is used to blend CAP water with reclaimed water for vadose zone injection.

- **City Of Scottsdale, Site 32 Onsite Chlorine Generation Evaluation and Facility Modifications, Scottsdale, Arizona (March 2011 – October 2012), Project Manager:** Project includes evaluation of 2 x 250 pound per day on-site chlorine generation systems to replace a chlorine gas system. The project ultimately ended up with sodium hypochlorite addition system that is convertible to a OSCG system in the future. Responsibilities included design, permitting, oversight and engineering support during construction. Project was delivered as a design-build project.
- **City Of Scottsdale, Site 7 Arsenic Treatment Facility Piping Modifications, Scottsdale, Arizona (January 2012 – October 2012), Project Manager:** Project includes design and installation of a control valve and flow meter for controlling bypass water for an Arsenic removal system. Responsibilities included design review, oversight and engineering support during construction and permitting. Project was delivered as a design-build project.
- **City Of Scottsdale, Site 80 On-Site Chlorine Generation Systems, Scottsdale, Arizona (August 2011 – September 2012), Project Manager:** Project includes design of 2 x 500 pound per day Siemens on-site chlorine generation systems complete with hydrogen removal systems, brine systems, water softeners, controls and containment canopy. Responsibilities included design review, oversight and engineering support during construction. Project was delivered as a design-build project..
- **City of Goodyear, Bullard Water Campus, Goodyear, Arizona (January 2006 – June 2008), Project Manager:** Assisted with the design and construction of a 10-mgd brackish groundwater RO system as part of a Design/Build Team. Responsible for the procurement of a 0.5-mgd, 18 inch diameter Koch MegaMagnum™ RO System and two additional 0.5-mgd 8 inch RO trains. Developed detailed process design of the overall RO system including the blending strategies. Developed detailed RO building drawings and provided review and oversight of the overall design.
- **City of Goodyear, On-Call Operations and Membrane Support Services, Goodyear, Arizona (November 2006 – November 2007), Project Manager:** Provided operations support services to assist the City with operation of their RO systems. Provide periodic review of all membrane performance and operational data. Provide specifications for membrane replacements and chemical procurement to allow competitive bidding. Review existing system operations to optimize system recovery to reduce concentrate going to the wastewater treatment plant. Provide input on concentrate treatment strategies. Provide operating cost model for selecting the optimum water quality and system operating parameters.
- **City of Goodyear, Centerra Wellhead Treatment System, Goodyear, Arizona (December 2003 – June 2004), Project Manager:** Prepared procurement documents for the 7 wellhead RO units for the project. Provided preliminary design information for the design of the Well 11 Temporary Improvements and the Permanent RO system design.

Water Campus. 76th Annual AWPCA Conference Proceedings

Kevin Alexander, William Vernon. June 2000, Reuse Solutions Using Microfiltration and Reverse Osmosis at the Scottsdale Water Campus, In AWWA Annual Conference Proceedings.

Kevin Alexander. March 2007. High Pressure Membrane Plant Operation at the Scottsdale Water Campus and Orange County Water District. Presented at AWWA Membrane Technology Conference Workshop

Kevin Alexander. November 2007. Membrane Technology: State-of- the-Art and Research Needs for Brackish Water Applications. Presentation to Arizona Water Institute

Eric Owens, Kevin Alexander. July 2007. Membrane Plant Operations and Troubleshooting. Presentation for Southwest Membrane Operators Association Workshop. Also Published in Water and Wastewater Digest October 2007.

Supported the City with review of RO system shop drawings and inspection of the equipment and membranes.

- **City Of Scottsdale, Pump Station 68 Retrofit, Scottsdale, Arizona (August 2011 – March 2012), Project Manager:** Assisted with development of detailed mechanical plans and specifications for a 525 gpm pump station retrofit project. The project converted horizontal pumps to vertical drypit pumps to allow the pump station to meet current electrical codes. Project was delivered as a design build project.
- **City Of Scottsdale, Hualapai Drive 24 inch Pipeline, Scottsdale, Arizona (1997-1998), Project Engineer for Black & Veatch:** Developed design plans and specifications for a 0.5 mile pipeline in Hualapai Drive. The pipeline was design and installed to carry reclaimed water in the RWDS system. Responsibilities included design and engineering support during construction.
- **City Of Scottsdale, DC Ranch Pump Station and Reservoir, Scottsdale, Arizona (1998-1999), Project Engineer for Black & Veatch:** Project included the design of a 1.5 million gallon buried reservoir and a 5-mgd vertical turbine pump station. Responsibilities included design review and engineering support during construction.
- **City of Chandler, IPWTF 20" Product Water Pipeline and 8 inch Concentrate Pipeline, Chandler, Arizona (1995-1996), Project Engineer for Black & Veatch:** Developed design plans and specifications for a 6.5 mile pipeline in Ocotillo Road from the IPWTF treatment Plant to the evaporation ponds and injection wells. Responsibilities included design and engineering support during construction.
- **City of Phoenix, SROG Salinity Research on Concentrate Management Pilot Demonstration Project, Phoenix, Arizona (May 2010 – present), Project Manager/Membrane Processes:** Assisting with design, operation and implementation of a pilot program to evaluate treatment processes for high recovery and concentrate minimization. Responsible for Pilot design, P&ID drawings, treatment process operating and testing protocols and reviews, membrane system protocols, literature review, data analysis and reports.
- **City of Phoenix, Western Canal WTP Pilot Study, Phoenix, Arizona (July 2007 - Dec 2011), Project Manager/Membrane Processes:** Assisting with design, operation and implementation of a pilot program to evaluate Microfiltration, Reverse Osmosis, Intermediate Lime Clarification and Concentrate RO system for high recovery and concentrate minimization. Responsible for Pilot P&ID drawings, flat sheet membrane protocol and reviews, membrane system protocols, literature review, data analysis and reports.
- **Tuscan Water, Water Quality Improvements and Evaluation Project, Tucson, Arizona (May 2005 – January 2008), Project Manager:** Provided a comprehensive membrane system evaluation for rehabilitation of Hayden Udall Water Treatment Plant with MF and RO. Provided a treatment process evaluation of treating CAP water or recovered water with RO and what the maximum recovery would be achieved. Evaluated the concentrate management alternatives including evaporation, augmented evaporation, V-SEP and brine concentrators. The treatment alternatives capital and operations costs were determined and a final process selection was made. The cost information was used in a community outreach program to assess if the community would pay for lower TDS water.
- **Rayne, Centralized Regeneration Salt and Water Reclamation Project, Phoenix, Arizona (February 2008 – May 2010), Project Manager:** The project evaluated treatment alternatives and costs for treating Ion Exchange blow-down to recover the salt and water to minimize discharge to the sewer. Develop testing protocol for testing NF membranes and Lime/Soda Ash Treatment. Assisted with data review and reduction to evaluate the most cost effective treatment. Provided a final report of all testing, process selection and cost results and made recommendations for further pilot testing.

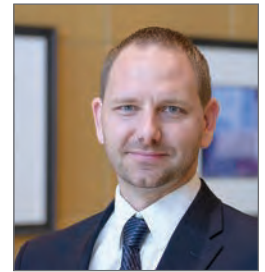
- **City of Phoenix, Central Arizona Salinity Study, Phoenix, Arizona (2006 – 2007), Project Manager/Membrane Processes:** Provided assistance with development of the report on Brackish water treatment. Provided technical review of the Concentrate treatment alternatives.
- **City of Chandler, IPWTF Concentrate Evaporation Ponds, Phoenix, Arizona (2006 – 2007), Project Engineer for Black & Veatch:** Assisted in the development of a 32 acre evaporation pond system. Responsible for earthen berm cross-sections, material balance and specifications for the facilities. Assisted with construction administration and startup of the facilities.
- **Tucson Water Department, Tucson Reclaimed Water Master Plan, Tucson, Arizona (November 2011-present), Project Manager:** The project is providing planning roadmap for the City of Tucson Water Department for how to implement reclaimed water as a new source of water in their service area. Participated in a feasibility study for a 7 and 19-mgd complete treatment process including concentrate treatment. The alternatives analysis included over 25 different process alternatives. Participated in NWRI panel evaluation of the treatment processes. Was responsible for developing all concentrate treatment options and cost analysis of the treatment and disposal alternatives.
- **City Of Scottsdale, Water Campus Expansion, Scottsdale, Arizona (June 2008 – Present), Project Manager:** The project is a 8-mgd expansion of the existing 12-mgd advanced water treatment system which uses MF and RO to reclaim tertiary effluent. The project includes replacement of the MF system with a newer style MF system and addition of a RO system utilizing large diameter RO elements. Developing the conceptual design and detailed design of the MF system and RO system. Developing MF system procurement to allow bidding through the general contractors.
- **Willow Springs, Water Reclamation Facility, Tucson, Arizona (2005-2006), Project Manager:** Negotiated the procurement of a 0.5-mgd MBR treatment system. Provided design and process oversight and review. Developed project approach to expedite the design of the treatment plant.
- **Merrill Ranch, Water Reclamation Facility, Florence, Arizona (2005-2006), Project Manager:** Developed procurement documents and negotiated the procurement of a 1.5-mgd MBR treatment system. Provided design and process oversight and review. Assisted in the analysis of various alternative facility capacities including 1, 1.5, 2.0, and 3.0-mgd to find most cost effective facility size based on capital and operating costs of the facility.
- **City Of Scottsdale, Water Campus: Phase 3 Expansion and RWDS Study, Scottsdale, Arizona (November 2003 – 2005), Project Manager:** Prepared plans and specifications for expansion of the MF and RO system to 13.8-mgd. Prepared a test program to evaluate the RO system operation at the expanded capacity. Negotiated MF membrane replacement costs on behalf of the City. Performed an evaluation of RO permeate for the RWDS system for the golf courses.
- **City Of Scottsdale, Water Campus Expansion Phasing Study Scottsdale, Scottsdale, Arizona (January 2002 – December 2002), Project Manager:** Assisted in the preparation of the detailed Water Reclamation Plant Expansion Phasing and Planning report to address future expansion of the existing 12-mgd WRP, MF and RO System to an ultimate capacity of 30-mgd. Responsible for evaluation of the feasibility of MBR technology in place of future expansion.
- **City Of Scottsdale, Scottsdale Water Campus RO System Expansion, Scottsdale, Arizona (January 2000 – October 2002), Project Manager:** Prepared plans and specifications for a 3.4-mgd RO System Expansion to increase the capacity of the RO system to 12-mgd. The project includes preparation of the detailed design and construction phase services.
- **City of Peoria, Butler Drive Wastewater Treatment Plant-Value Engineering Study, Peoria, Arizona (2006), Project Manager:** Participated in the value engineering study as the membrane and process expert for a 13-mgd MBR treatment system. Responsible for development of process design alternatives

and membrane equipment evaluation to save costs during construction and operation of the facility.

- **Arizona American Water Company, Anthem Water Campus – Phase 2, 3 and 4 Wastewater Plant Expansion, Anthem, Arizona (1999 – 2005), Project Manager:** Assisted with the evaluation, design, and construction of a 4.5-mgd MBR treatment plant used for irrigation and recharge. The plant has been expanded in 4 Phases. Assisted with the development of the MBR process and prepared equipment procurement documents for Phase 2, 3 and currently for Phase 4. Developed the process configuration for the facility and participated in the treatment plant detailed design. Managed the membrane procurement contracts throughout the construction.
- **Citizens Water Resources (prior to Arizona American Water Company), Anthem Water Campus – Phase 1 Process Review Study, Anthem, Arizona (1999 – 2000), Project Manager:** Evaluated membrane performance issues and biological operating issues with a 0.5-mgd MBR. The MBR was only second in the USA. The evaluation showed that the manufacturer had not provided adequate amount of membrane for the facility. The study proved that there was need for more membrane and allowed for negotiations to proceed with the manufacturer.
- **City Of Scottsdale, Water Campus Phase 1 and 2, Scottsdale, Arizona (1995-1999), Project Engineer for Black & Veatch:** Prepared plans and specifications for a 12-mgd water reclamation facility which utilizes a conventional Nitrification/Denitrification process followed by tertiary filtration. The tertiary filtered water is then delivered to golf courses during the summer and during the winter the 8-mgd of filtered water is treated with MF and RO and injected into the vadose zone.
- **City of Chandler, Industrial Process Water Treatment Facility, Chandler, Arizona (1995-1997), Project Engineer for Black & Veatch:** Responsible for the construction administration of a 1200 gpm Nanofiltration facility and 1800 gpm MF and RO facility treating acid waste neutralization and the ultra-pure water system concentrate stream from Intel. Responsible for the design of the pipelines and concentrate evaporation ponds and injection wells for aquifer storage.
- **City of Chandler, Ocotillo Wastewater Treatment Plant Expansion, Chandler, Arizona (1996-1998), Project Engineer for Black & Veatch:** Responsible for preliminary and detailed design of the expansion of the nitrification and denitrification facilities and the solids handling systems. The project included expanding the existing facility from 7.5 to 10-mgd by adding additional influent pumping, odor control, anoxic and aeration basins, additional solids storage, additional traveling bridge filter and product pumping.
- **City of Phoenix, 23rd Avenue Wastewater Treatment Plant Solids Processing Facility, Phoenix, Arizona (1997-1999), Project Engineer for Black & Veatch:** Responsible for preliminary and detailed design of the solids handling building process mechanical systems including TWAS and WAS pump stations, sludge conveyors and bulk storage bins and the centrifuges. The project included a new digester and new solids handling building for an existing 57-mgd wastewater treatment plant. The solids handling building included sludge pumping, chemical handling and feed systems, four centrifuges, solids conveyor system, live-bottom hoppers and truck loading station.
- **Water Reuse Foundation, New Techniques for Real-Time Monitoring of Membrane Integrity for Virus Removal (Project WRF-09-06A), California (Nov 2009 to Present), Project Advisory Team Reviewer:** Assisted with the review of the technical approach and project development and progress of the project.
- **Water Reuse Foundation, New Techniques for Real-Time Monitoring of Membrane Integrity for Virus Removal:** Pulsed-Marker Membrane Integrity Monitoring System (Project WRF-09-06B), California (Nov 2009 to Present), Project Advisory Team Reviewer: Assisted with the review of the technical approach, project development and progress of the second project.

- **Water Reuse Foundation Tailored Collaboration, Demonstrating an Innovative Combination of Ion Exchange Pretreatment and Electrodialysis Reversal for Reclaimed Water Reverse Osmosis Concentrate Minimization WRF-09-08, California and Las Vegas, Nevada (2008 to 2011), Technical Advisor to the Project Team:** Provided technical review of the MF and MBR, RO, Ozone, Hydrogen Peroxide/Ozone Treatment ahead of the RO systems. Assisted with the review of quarterly reports and provided oversight of operating data from 4 different pilot test systems.
- **Water Reuse Foundation Tailored Collaboration, Pilot-Scale Oxidative Technologies for Reducing Fouling Potential in Water Reuse and Drinking Water Treatment Membrane Systems WRF-10-08, Scottsdale, Arizona (2010 to 2013), Project Manager, Author and Technical Advisor:** Provided technical review of the EDR System operations and results from a 1 year pilot study on RO Concentrate from the City of Scottsdale Water Campus Advanced Water Treatment System. The RO concentrate was further treated by Ozone, BAF, IX and EDR. The study evaluated EDR concentrate for regeneration of the Ion Exchange System.

Curtis D. Courter, P.E.
Senior Associate
Tempe, Arizona



Areas of Expertise

- Project Management
- Conveyance Systems
- Water / Wastewater Process Design
- Construction Engineering and Administration
- Facilities Planning

Professional Record

Mr. Courter is a Senior Associate with over 18 years of experience in planning, design and construction of numerous water, wastewater and stormwater projects. As a Program Manager and Project Manager on numerous assignments, Mr. Courter has provided overall program and project management direction, including development of plan documents, direction of project teams and subconsultants, coordination of task level activities, direction of multiple design and construction contracts, client interface and coordination, community involvement programs, quality control reviews, and specific technical direction for program and project design and construction contracts. He has a strong track record in developing and managing schedules, budgets, document control systems, contract procurement activities, as well as program and project management progress reporting. Mr. Courter's experience includes condition assessment, design, construction administration, and start up of both below grade horizontal and above grade vertical water and wastewater assets.

Mr. Courter has over 18 years of experience in planning, design, and construction administration of water and wastewater facilities.

- **Estrella Mountain Ranch Southern Solutions Water Supply Project, Goodyear, AZ – Newland Communities:** During Phase 1, Mr. Courter served as the Project Engineer for master planning of a new RO treatment plant, transmission pipelines, raw water wells and concentrate evaporation ponds. As the Project Manager for the Phase 2, Mr. Courter will lead the design of the RO WTP and related work.
- **Coachella Valley Colorado River Supply Pipeline Routing Study, CVWD, Palm Desert, CA:** Evaluating alignment alternatives for a 60" to 84" raw water line from the Coachella Canal to a groundwater recharge facility. Includes identifying pumping requirements and construction methods.
- **North Olmsted Collection System Improvements – North Olmsted, OH:** Project manager for the evaluation, design and construction admin- >>

Academic Credentials

MBA	Business Administration University of Michigan Dearborn
MS	Civil Engineering, Wayne State University
BS	Civil Engineering, Wayne State University

Professional Engineer: Arizona, Ohio, Kentucky, Michigan, Pennsylvania

Employment Record

1997-Pres.	Hazen and Sawyer, P.C.
1996	Ford Motor Co., Vandyke Plant Engineering Dept.

Professional Activities

Arizona Water Association
American Water Works Association
Water Environment Federation - Disinfection and Public Health Committee

Selected Publications

"In-Line Disinfection of a CSO First Flush Basin in Detroit." 2013. WEF Disinfection and Public Health Conference 2013, Indianapolis, IN, February 2013.

"Wet Weather Disinfection Alternatives" Ohio Water Environment Association Buckeye Bulletin, Vol. 84:3, Issue 2 August 2011.

"What if Industrial Flows Don't Make It to the Plant? SD1's Determination of Potential Water Quality Impacts from Non-Domestic Dischargers in their Combined Sewer System" Proceedings of the Water Environment Federation Collection Systems 2010, Phoenix, AZ, 2010.

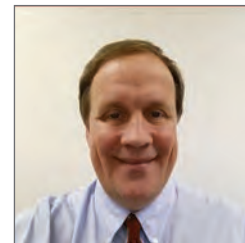
"Skimming the Surface Options for Solids and Floatables Control" Water Environment & Technology, Vol. 21, No. 5, May 2009

istration of collection system improvements including 7,000 feet of new sewer lines ranging in size from 12- to 24-inches, and upgrades to three pump stations, the 4.5 mgd LeBern, 7.9 mgd Dover and 7.5 MGD Clague Park Pump Stations. The condition assessment and evaluation included GIS, CCTV, pump records, SCADA data, sewer drawings, etc. in order to develop an improvement plan. The work was completed in two phases through 3 separate construction contracts and is fully operational.

- **Tanks Trihalomethane Removal Systems – Pittsburgh Water and Sewer Department:** PM for the evaluation, design and CA of in-tank spray aeration trihalomethane removal systems for the Allentown and Squirrel Hill Tanks.
- **Banklick Creek Regional Wetlands – Sanitation District No. 1 of Northern Kentucky:** PM for design and CA of a 30-inch inlet storm sewer, a 5.8 MGD triplex pumping station and one 6-inch and two 10-inch ductile iron force mains, including related electrical, controls and remote communications systems.
- **Provided design and CA for around \$230 million** of wastewater screening and disinfection facilities including the 100-mgd CSO 005/006 Facility for Nashua, NH, the 327 mgd Alley Creek Facility for New York City, as well as the 221 mgd Puritan East and 8,600 mgd Conner Creek facilities for the Detroit Water and Sewerage Department. His work on these projects included life cycle cost estimating, pilot testing of emerging technologies, gravity pipeline and force main design, pipeline rehabilitation and stormwater management.
- **Second Street Pump Station Screen Condition Assessment and Rehabilitation – Sanitation District No. 1 of Northern Kentucky:** Project manager and lead designer for the rehabilitation of a pump station screening facility, including upgraded electrical, structural rehabilitation of a below grade concrete chamber, screen replacement, and related electrical and instrumentation. Project entailed the condition assessment and rehabilitation design for a remote pump station screening facility located across a river from the interceptor lift station. The existing catenary bar screen was replaced along with the associated controls and electrical. The condition assessment identified structural deficiencies and that the chamber roof lacked adequate capacity to support its existing loading as part of a parking lot. The design therefore included demolition and replacement of the chamber roof and access hatches.
- **Conner Creek CSO Control Facility – Detroit Water and Sewerage Department:** Project engineer and resident engineer responsible for nearly all aspects of the \$186.5 million Connor Creek CSO Control Facility. This 8 year project included cleaning, inspection, prioritization and rehabilitation design for over 2,200 feet of large triple box cast-in-place concrete sewer (3 x 18'w x 21'-9"h), as well as cleaning CCTV, PACP grading, and rehabilitation of over 4,100 feet of large diameter brick sewers ranging from 48-inches to 78-inches. New construction included of over 600 feet of 12-inch PVC and 3,400 feet of 48-inch PRCP sanitary sewers and associated manholes, junction chambers and drop manholes, as well as an extensive site drainage system including 1,240 feet of 8 to 24-inch PVC, over 500 feet of 12 to 24-inch PRCP, and nearly 4,000 feet of 12-inch perforated HDPE storm and drain piping.
- **Managed or assisted on numerous projects at four of the five Detroit Water and Sewerage Department WTPs, through several on-call contracts, including:** Springwells WTP (540 mgd); Water Works Park WTP (240 mgd); Northeast WTP (300 mgd); and Southwest WTP (240 mgd). Projects included pilot testing of DAF and other technologies, flocculation, disinfection and HVAC.
- **Water System Improvements Project, Contract No. 6 - Independence Township, MI:** CM for upgrades to the disinfection systems at two well sites, along with a new submersible well pump and well house modifications at a third site.
- **As-Needed CIP Assistance – Sanitation District No. 1 of Northern Kentucky:** Project manager and lead engineer for the evaluation of numerous sewer regulator chambers. Recommendations included structural modifications to maximize flow to treatment.

Doug Kobrick, PE

Senior Associate



Areas of Expertise

- Wastewater Treatment
- Water Reclamation
- Water Resources Planning
- Water and Wastewater Conveyance
- Water Demand Management

Professional Record

Mr. Kobrick is a Senior Engineer in the Tempe, Arizona office of Hazen and Sawyer. He has experience on a wide range of Arizona wastewater and water projects including studies, designs, and construction phase services. Mr. Kobrick recently joined Hazen and Sawyer. His previous experience includes:

- **Coachella Valley Colorado River Supply Pipeline Routing Study, CVWD, Palm Desert, CA:** Evaluating alignment alternatives for a 60” to 84” raw water line from the Coachella Canal to a groundwater recharge facility. Includes identifying pumping requirements and construction methods.
- **City of Prescott, Zone 27 Water Improvements:** Construction phase services for 5 mgd booster pump station, 1.25 MG prestressed concrete reservoir, and water main replacement. Also involved redesign services to correct issues from others that arose during construction of the project.
- **Yavapai Apache Nation, I-17 Corridor Wastewater and Water Improvements:** Design and construction phase services for a design-build project to provide two wastewater pump stations, 1 mile of dual 8-inch diameter HDPE force main, 3 miles of 10-inch diameter PVC gravity sewer, and 0.5 mile of 6-inch PVC water main. Project included coordination with multiple agencies including the US Forest Service, Bureau of Indian Affairs, Indian Health Service, Town of Camp Verde, and Yavapai County. Project was completed on a fast-track schedule of one year from start of design to completion of construction.
- **Lake Havasu City, Reclaimed Water Master Plan:** Master plan to optimize reuse of reclaimed water produced by the City’s three reclamation plants including cost-effective extensions of the existing reclaimed water distribution system. An evaluation was performed to determine the value of reclaimed water in offsetting the City’s potential future requirements for water rights acquisition. Alternative scenarios were evaluated for expansion of the reclaimed water system.
- **Lake Havasu City, Island WWTP Filter Rehabilitation:** Design and construction phase services for design-build project to provide a new 2.5 mgd cloth disk filter facility. A competitive equipment procurement was

Academic Credentials

MS	Civil/Environmental Engineering, Arizona State University, AZ, 1993
BS	Civil Engineering, Brown University, RI, 1980

Professional Engineer: Arizona

Employment Record

2014-Pres.	Hazen and Sawyer, P.C.
2012-2014	Atkins North America, Inc.
2010-2012	Doug Kobrick, P.E., PLC; Consulting Engineer
2003-2010	Camp Dresser & McKee, Inc.
2000-2003	Black & Veatch Corporation, Seattle, WA
1984-2000	Black & Veatch Corporation, Phoenix, AZ

Professional Activities

- AZ Water Association
- Chair of the Wastewater Treatment Committee
 - Member of the Conference Program Committee
- American Water Works Association
- Long-term member, Water Conservation Division
- Water Environment Federation

Select Publications

“The Changing Nature of Arizona Wastewater: Implications for Planning, Design, Operation and Reuse.” Presented at the 2012 annual conference of the AZ Water Association.

conducted to select the optimum filtration system for the City's needs. Project was completed on a fast-track schedule of 150 days from start of design to completion of construction.

- **City of Prescott Zone 7 Water Improvements:** Design completion for a 3 mgd water booster pump station.
- **Town of Quartzsite Water Supply Study:** Assistance for determination of adequate water supply and plan for potential utilization of Colorado River water.
- **City of Chandler, Evaluation of Miscellaneous Surface Water Treatment Plant Improvements:** Study to evaluate various operations-related issues at surface water treatment plant and recommend corrective action. Items evaluated included thickening of sludge from a ballasted flocculation process, issues with sodium hypochlorite piping, alternatives to optimize raw water pumping, and other maintenance related items in the plant.
- **City of Phoenix, Assessment of ICI Water Demand Trends- Heating and Cooling Sector:** Research into factors causing decrease in water consumption by industrial-commercial-institutional water customers and projections of future trends. Study focused on water use in cooling tower systems.
- **Lake Havasu City, Well Rehabilitation:** Design services to convert an existing monitoring well to serve as a water supply for landscape irrigation at the City's municipal office complex.
- **Hi-Desert Water District:** Evaluation of wastewater treatment options associated with citywide septic-to- sewer project in Yucca Valley, CA.
- **Bullhead City; Section 18 WWTP Modifications:** Oversight and design review of improvements to address operational needs at an existing 2 mgd membrane bioreactor WWTP, including dedicated membrane cleaning tanks and other modifications to support plant O&M staff.
- **Valiano Partners:** Evaluated wastewater treatment alternatives for a master-planned community in northern San Diego County, including potential treatment processes and possible opportunities for joint service with other nearby entities.
- **Far West Water & Sewer, Inc., Wastewater Engineering Services:** Provided wastewater engineering services to improve treatment process and operations and reduce costs at two wastewater treatment plants.
- **Newland Communities, City of Goodyear – Cotton Lane Water Transmission Main Extension:** Design of approximately 4,200 l.f. of 20-inch diameter ductile iron water main.
- **Camp Verde Sanitary District, On-call Engineer for Wastewater Treatment Issues:** Design of new disk filters and septage handling improvements at the district's wastewater treatment plant. Evaluated sludge management alternatives and developed a plan for on-site composting of digested biosolids to eliminate the need for landfill disposal.

"Fountain Hills Sanitary District: 40 Years of Zero-Discharge through Innovation and Persistence." Presented at 2011 WateReuse Symposium; Chandler, Arizona

"Fountain Hills Sanitary District: Four Decades of Innovation in Total Reuse." Poster presentation at 2011 WEFTEC Conference; Los Angeles, California. The WEFTEC paper was published in an edition of WEF's WE&T magazine.

Prepared a master plan for future improvements and expansion of the treatment plant and to make optimal use of the treatment plant site. Provided construction phase services and design review for a pump station improvements project. Prepared assessment of treatment plant condition and capability.

- **Fountain Hills Sanitary District, Construction Phase Engineering Services – Aquifer Storage/Recovery Well 5:** Provided engineering services during construction of a reclaimed water pump station expansion, reclaimed water transmission main and aquifer storage/recovery well.
- **Fountain Hills Sanitary District, Fountain Lake Water Quality Evaluation:** Study of potential filtration alternatives and other approaches to improve the water quality of Fountain Lake, which receives reclaimed water and has significant issues with algae growth.
- **Newland Communities, City of Goodyear Water and Wastewater Engineering Evaluations:** Evaluation of water supply alternatives, and potential improvements to existing water reclamation plant. Review and value improvement suggestions for upgrades proposed by the City of Goodyear's engineering consultant.
- **Fountain Hills Sanitary District, Feasibility Evaluation of Lift Station 14:** Study to evaluate the possibility of constructing a gravity sewer, using trenchless construction techniques, to eliminate existing Lift Station 14.
- **Arizona Municipal Water Users' Association, Facility Managers' Conservation Guidebook Updates:** Revisions and updates to an existing water conservation guidance document aimed at managers of significant water-consuming facilities in the metro Phoenix area. Assistance in converting from a printed document to Web based presentation of the information.
- **Buckeye, AZ, 9 mgd Central Buckeye WWTP Expansions:** Three separate 3 mgd designs, to expand plant from 1 mgd to 10 mgd. This project was the first application of the Bardenpho nutrient removal process in metropolitan Phoenix, necessary due to significantly elevated sewage strength. Project included a new influent pump station, grit removal units, mechanically-cleaned bar screens, bioreactors performing the Bardenpho process, secondary clarifiers, cloth disk filters sodium hypochlorite disinfection and effluent pump station. A complete new plant control system was provided. A dual belt presses were provided for dewatering biosolids.

The initial phase of the project was performed on accelerated schedule to avert a threatened subdivision moratorium associated with lack of treatment capacity. A portion of the new facilities were constructed first, coupled with reuse of some existing structures on a temporary basis to get a quick increase in capacity to meet short-term needs. The first-phase expansion was selected as 2006 Project of the Year by the Arizona section of the American Public Works Association.

- **Scottsdale, AZ, Well 86 Water Quality Improvements:** Project was performed to address issues with milky water that were found by the initial study to be due to entrained air bubbles in groundwater produced by Well 86 in far north Scottsdale. Designed a new 0.5 MG concrete reservoir/deaeration facility. Project also included a new 10 mgd high-service pump station to eliminate an outmoded existing pump station serving the upper zones in the Scottsdale water distribution system.
- **Bullhead City, AZ, 2 mgd Membrane Bioreactor Wastewater Treatment Plant Design-Build:** Study design and construction phase services for a 2 mgd membrane bioreactor plant constructed on the site of a smaller existing plant which was then taken out of service. One of the first MBR plants in Arizona. Mr. Kobrick was Project Director for design and construction of the entire \$18 million project. Conducted a competitive process for selection of the MBR system equipment among competing manufacturers. Project also includes a headworks performing flow metering and fine screening, chlorine disinfection, and aquifer recharge basins. Project was completed \$1 million below the City's budget allowing for the addition of betterments to the facility and wastewater system.

- **Williams, AZ, 1 mgd Wastewater Treatment Plant Design-Build:** Study, design, and construction phase services for a new 1 mgd wastewater treatment plant that replaces a lagoon –based treatment system that had reached the end of its life. Plant includes a headworks performing screening and grit removal, an influent pump station, septage receiving station, oxidation ditch with oxic and anoxic zones for biological nitrogen removal, two clarifiers, sludge thickening tank, belt filter press for biosolids dewatering, and an operations/laboratory building. Mr. Kobrick was Project Director for design and construction of the entire \$12 million project. Construction self-performed by CDM.
- **Glendale, AZ, Wastewater System Master Plan:** Project Director for a master plan for the wastewater collection system serving Glendale (pop. 225,000). The project included an extensive program of flow monitoring, including over 100 monitoring locations. A condition assessment was made on known problem areas in the system and a sampling of areas throughout the rest of the city. Hydraulic modeling and analysis was performed to identify sewer reaches overloaded at present and in the future. A program of recommended improvements totaling over \$100 million was developed, with most of the work needed for rehabilitation of damaged or failing existing sewers.
- **Gila River Indian Community (AZ), 5 mgd Reverse Osmosis Groundwater Treatment Plant:** One of the largest groundwater desalting plants in Arizona constructed to date. Project also included storage tanks and off-site improvements (pipelines and pump stations).
- **Goodyear, AZ, 5 mgd Reverse Osmosis Water Treatment Plant Design-Build:** Project Manager for preliminary engineering on a planned \$52 million design-build project for a 5 mgd reverse osmosis groundwater desalter plus concentrate management facilities. value. Project was put on hold during preliminary design due to economic downturn.
- **Phoenix, AZ, 23rd Avenue WWTP Operability Improvements Design:** Study and design of various plant improvements to address operations and maintenance issues.
- **Phoenix, AZ, Cave Creek Water Reclamation Plant Effluent Toxicity Study:** Study of reverse osmosis and other approaches for mitigation of effluent toxicity issues at an existing 8 mgd water reclamation plant.
- **Mesa, AZ, Southeast Water Reclamation Plant Disinfection Retrofit:** Project Director for a project to design a conversion from UV disinfection at an 8 mgd water reclamation plant to sodium hypochlorite for reduced O&M cost and improved performance.
- **Apache Junction Water Company:** Design for 1 mgd wellhead arsenic removal system.
- **Fountain Hills Sanitary District:** Reclaimed water reverse osmosis pilot study to improve the quality of reclaimed water for reuse in irrigation at turf facilities.
- **City of Goodyear/Newland Communities, Well H7 RO Design:** 0.5 mgd reverse osmosis treatment facility design for a former agricultural well.
- **Glendale, AZ:** Design of rehabilitation and relocations for a 42-inch diameter interceptor sewer crossing beneath the Arizona Canal along Camelback Road.
- **King County, Denny Way CSO Program:** Served as Project Manager for design completion and construction-phase services on King County’s \$100 million+ Denny Way CSO program. Negotiated approximately \$2 million in contract amendments to address budget overruns inherited from predecessors. Total engineering contract value \$13 million.
- **King County:** Took over management of existing engineering projects for odor abatement and pump station improvements.

- **Yakima, WA:** Won and negotiated contract for B&V to serve exclusively as engineer for Yakima WWTP and collection system engineering services.
- **Fountain Hills Sanitary District:** Project Manager for design of a 3 mgd microfiltration Advanced Water Treatment Facility to produce high quality reclaimed water for aquifer injection. This facility was the second in the state of Arizona to employ microfiltration.
- **Safford:** Project Manager for design of a new 2 mgd new water reclamation plant. The plant uses the phased-isolation ditch process, the first application of this process constructed in Arizona. The plant includes a headworks, the bioreactor basins, clarifiers, traveling bridge sand filters, biosolids holding and thickening facilities, effluent disinfection, and an effluent pumping station for delivery of reclaimed water to reuse sites and also to the Gila River for seasonal discharge.
- **Fountain Hills Sanitary District:** 3 mgd WWTP expansion/replacement projects.
- **Yuma:** Figueroa WPCF - New 24 mgd headworks and anaerobic digester.
- **Avondale:** 3 mgd WWTP expansion.
- **Goodyear:** Corgett WRP. 0.8 mgd expansion.
- **Citizens Utilities - Sun City:** 99th Avenue interceptor rehabilitation.
- **Chandler:** 10 mgd Ocotillo WRP. Expansion, improvements, transmission main and pump station.
- **Prescott:** 2.2 mgd Airport WRP. Upgrade and expansion.
- **Fountain Hills Sanitary District:** Reclaimed water master plan.
- **Fountain Hills Sanitary District:** Wastewater master plan.
- **Scottsdale:** 1 mgd irrigation water filtration, distribution and recharge system.
- **Litchfield Park Service Company:** Water reclamation plant feasibility study and predesign.
- **Goodyear:** Lum Basin Water Reclamation Plant. Site study and preliminary design.
- **Peoria:** Lakeland Village (Vistancia) water/wastewater master plan.
- **Goodyear/Estrella:** Water supply and distribution system master plans, WTP site study.
- **Yuma:** Wastewater system odor control study.
- **Yavapai County, Big Park Improvement District:** Wastewater master plan, WWTP improvements.
- **Mesa:** Crismon Road 36-inch diameter water transmission main.
- **Phoenix:** Water treatment plant site evaluation.
- **Fountain Hills:** Fountain Lake relining and rehabilitation.
- **Salt River Project:** Technical evaluation of future Valley water treatment plants.

Jacqueline Shaw Rhoades, PE

Senior Principal Engineer



Areas of Expertise

- Water Quality and Treatment
- Direct Potable Reuse
- Carcinogenic Volatile Organic Compounds (cVOCs)
- Hexavalent Chromium

Professional Record

Ms. Rhoades's project experience has focused in areas of drinking water treatment including: Water Quality Compliance and Planning; Process Selection, Evaluation, and Testing; Treatment Operations, Commissioning, and Optimization; and Industrial Water Management. Project examples follow.

- **Water Research Foundation and Coachella Valley Water District – Hexavalent Chromium Implementation Plans:** Project engineer writing the implementation plan report that presents the system alternatives to combine and treat groundwater to comply with the California MCL for chromium 6. The evaluation considered water quality, land availability, proximity of individual wells, residual disposal, and capital and O&M costs.

Experience Prior to Hazen and Sawyer

- **Water Research Foundation and Coachella Valley Water District Hexavalent Chromium Compliance Plans (WRF 4445) / Coachella CA:** Reviewed background water quality data to characterize water sources and determine treatment technology applicability for Cr(VI). Developed a sampling and testing program for Reduction/Coagulation/Filtration bench-testing, Weak Base Anion Exchange pilot testing, and Strong Base Anion Exchange full-scale testing. Developed a decision framework for treatment selection during compliance planning. Conceptual level costs and final compliance plan development are on-going.
- **Water Research Foundation:** Survey of Existing VOC Treatment Installations (WRF 4453): Developed an internet-based survey to collect general engineering information from existing VOC treatment systems. Expanded the survey to include a smart spreadsheet survey for more detailed design and water quality information. Developed a database of compiled VOC treatment effectiveness and design information. Assessment of regulatory impact scenarios, GAC treatment effectiveness, and aeration treatment effectiveness is on-going.
- **AWWA and Suffolk County Water Authority Suffolk County Water Authority cVOC Case Study (WITAF #597) / Long Island NY:** Worked with industry experts to identify regulatory options for the upcoming cVOC rule. Collected existing treatment technology information and >>

Academic Credentials

MS	Environmental Engineering, University of Arizona, 2007
BS	Chemical Engineering, University of Arizona, 2005

Professional Engineer: Arizona

Employment Record

2013 - Pres.	Hazen and Sawyer, P.C.
2007 - 2013	Malcolm Pirnie, the Water Division of ARCADIS
2005	Student Research Intern at DOE/NSF Faculty and Student Teams (FaST) Program Pacific Northwest National Laboratory, Richland, WA
2004	Economics and Risk Analysis Intern at the US EPA Office of Solid Waste and Emergency

Professional Activities

AZ Water Association Secretary, Board of Directors, Committee Member, Committee Chair

Water Research Foundation PAC Member

American Water Works Association cVOC Regulatory Affairs Office Advisory Work Group Water Environment Association

Engineers without Borders

Water for People

Publications

Eaton, A., Chowdhury, Z., Shaw, J., Roberson, J. A., "The State of the Science of Analytical Methods for cVOCs" Journal AWWA, Vol. 104 Iss. 11, 2012, Page Range E572- E581, 10 Pages.

VOC occurrence data for SCWA system (over 190 wells). Estimated capital cost impact with regulatory scenarios. Developed representative GAC breakthrough curves to assess operational cost impacts. Performed additional sampling to validate low level projections of 1,2,3- TCP occurrence. Development of a JAWWA article is on-going.

- **Tucson Water Recycled Water Master Plan / Tucson AZ:** Identified recycled water program alternatives that addressed project uncertainties, including public acceptance. Reviewed recycled water sources and recharge and recovery locations and considered various conveyance/treatment options while developing water quality goals. Developed treatment process trains, determined treatment effectiveness relative to water quality goals, projected conceptual level costs, and evaluated alternatives using Criterium Decision Plus Software to identify the preferred alternative.
- **City of Scottsdale Regulatory Compliance Tracking System / Scottsdale AZ:** Reviewed and updated or created algorithms (decision trees) for NPDWR regulations including: total coliform, inorganic chemicals, asbestos, nitrate, nitrite, VOCs, SOCs, radionuclides, IESWTR, D/DBP, and lead and copper rules. Algorithms were incorporated into an online compliance system that manages the City's monitoring and reporting requirements and results.
- **California Urban Water Agencies Water Treatment Evaluation / Phoenix AZ:** Assisted in identifying planning level costs and intangible benefits associated with changes in intake water quality at treatment plants that utilize surface water from the Central Valley of California. Task work included: evaluating regional water quality data; defining baseline conditions by reviewing existing water treatment plant design and operational information; participating in a workshop with industry experts to develop future regulatory scenarios for current and emerging contaminants; developing representative 'virtual' water treatment plants for modeling and costing; and defining water quality values that would trigger the need for treatment modifications.
- **Confidential Client Arsenic and Fluoride Treatment Evaluation / Topock CA:** Aided in the selection of a viable treatment technology for arsenic and fluoride removal. Performed a background water quality data review, developed decision criteria, and considered project constraints including limited footprint and residual disposal options. Provided example design criteria and tours of existing treatment installations. Reviewed bench-scale testing plan and results that confirmed the recommended treatment option.
- **AWWA and Kern County Water Agency Kern County Water Agency TCP Study (WITAF #599) / Bakersfield CA:** Conducted an evaluation of the effectiveness of powdered activated carbon (PAC) for 1,2,3-TCP removal. Assessment included the development and execution of a bench-scale testing program that simulated a conventional surface water treatment plant with groundwater and groundwater/surface water blends.
- **Confidential Client WTP Residuals Assessment / Denver CO:** Reviewed

Shaw, J., Passantino, L., Chowdhury, Z., Hayes, T., Kindred, M., "Using Chlorine Dioxide to Reduce Distribution System THM Formation: Costs, Benefits, and Operational Implications" Proceedings, Annual Conference and Exposition, American Water Works Association (AWWA), Chicago IL, July 23, 2010.

Shaw, J.K., Cotton-Leto, C.A., Chowdhury, Z.K., Archibald, E., "Planning for Compliance: An Evaluation of Water Quality Conditions that Could Trigger the Need for Treatment Changes," Proceedings, Water Quality Technology Conference (WQTC) and Exposition, American Water Works Association (AWWA), Seattle WA, November 15- 19, 2009.

Shaw, J.K., Pepe, L.K., Ela, W., Saez, E., "Damage Control: Managing the Residuals Generated During Arsenic Treatment," Proceedings, 2008 Water Quality Technology Conference and Exposition, American Water Works Association, Cincinnati OH, November 16-20, 2008.

Shaw, J., Fathordoobadi, S., Zelinski, B., Ela, W., Saez, A., "Stabilization of arsenic-bearing solid residuals in polymeric matrices" Journal of Hazardous Materials, 152:3:1115, April 15, 2008.

Honors and Awards

Young Professional (YP) of the Year, AZ Water Association, 2013

Select Society of Sanitary Sludge Shovelers (5S), AZ Water Association, 2013

Busch Prize Nominee, ARCADIS, 2012

Quentin Mees Research Award, AZ Water Association, 2011, Using Chlorine Dioxide to Reduce TTHM Formation: A Full- Scale Evaluation

source water quality and water treatment plant performance data to assess the impact of source water uranium levels on water treatment residuals. Developed a mass balance of uranium through the liquid and solids handling treatment processes and identified disposal options based on multiple source water quality scenarios.

- **City of Phoenix ClO₂ Demonstration Testing / Phoenix AZ:** Evaluated the effectiveness of chlorine dioxide pre-oxidation for reducing the formation of trihalomethanes. Full-scale demonstration testing at 50 mgd included evaluation of THM formation in the WTP and the distribution system. The WTP and distribution system were also simulated on the bench-scale and in pipe-loop studies. Task work included developing a testing plan and sampling protocol; performing a fluoride tracer study to determine distribution system water age; verifying analytical methods and on-line analyzers for chlorite monitoring; optimizing a ferrous chloride feed strategy for quenching chlorite; completing bench-scale experiments; collecting water samples; performing a corrosion (iron release) pipeline study, analyzing data, and developing a final project report.
- **City of Scottsdale Scottsdale AWT Expansion / Scottsdale AZ:** Assisted in the identification and prioritization of emerging contaminants of potential concern. Performed a literature search to summarize occurrence, health effects, and treatability of multiple contaminants with advanced oxidation processes. Assisted in the development of a monitoring plan for NDMA formation.
- **City of Goodyear Adaman Well Project / Goodyear AZ:** Performed a data review of groundwater quality in the service area. Assessed potential arsenic treatment options including adsorption and ion exchange. Performed preliminary cost estimates of the potential groundwater treatment options as they apply to well-head treatment or centralized treatment. Investigated the feasibility of recharging Colorado River water from the Central Arizona Project in the service area. Developed preliminary cost estimates for the conveyance of the surface water to the recharge area and over five different recharge scenarios. Assisted in the production a design concept report.
- **City of Phoenix Union Hills WTP Disinfection Byproducts Mitigation Improvements Project / Phoenix AZ:** Provided assistance during start-up and commissioning of filters recently converted from sand/anthracite to GAC. Filters initially experienced decreased filter runtimes due to particle breakthrough. The assessment included optimizing the chemical dosing scheme, reviewing and modifying the system hydraulics, performing filter evaluations including filter coring, floc retention analysis, backwash profiles, and evaluating the filter media configuration. Upon implementing the recommended filter media configuration modifications, the GAC filter run times and effluent turbidities returned to acceptable levels.
- **Confidential Client WTP Commissioning / Ajo AZ:** Assisted in the start-up and commissioning of an activated alumina water treatment plant that removes arsenic and fluoride from groundwater. Project work included development of a sampling plan, on-site sample collection and analysis, instrument troubleshooting, and operator training.
- **City of Phoenix Deer Valley Water Treatment Plant Design / Phoenix AZ:** Assisted with start-up and commissioning of the sand ballasted flocculation (SBF) process and GAC filters. Motivated by rising filtered effluent turbidity and decreased filter runtime, optimization of pre-treatment (processes upstream of GAC filters) was performed. Project work involved sample collection, laboratory analysis (pH, turbidity, iron, zeta potential), and data analysis to develop trends of filter run times versus process conditions. Additionally, jar tests and a filter media evaluation was performed. As a result of modifying the pretreatment chemical addition scheme (SBF polymer type/dose, coagulant dose/feed locations), GAC filter run times and turbidity returned to acceptable levels.
- **City of Phoenix 24th Street WTP Optimization / Phoenix AZ:** Performed an optimization study to evaluate methods for treating challenging water quality events (e.g., high turbidity in the source water). Task work included reviewing historical water quality, production, and design data; performing bench-

scale testing to simulate extreme turbidity events; assisting in a comprehensive performance evaluation that identified process and operational constraints; assisting in the development of Standard Operating Procedures (SOP) for use during these water quality (turbidity) events; and performing staff training on the SOP.

- **City of Mesa Brown Road WTP Emergency Filter Repairs / Mesa AZ:** Conducted a filter media evaluation to verify filter media characteristics and depth and determine requirements for replacement of lost filter media. Project work included a review of backwash procedures, filter media coring and sample collection, data analysis, and development of a summary memorandum.
- **City of Tempe STWTP Water Quality Improvements / Tempe AZ:** Performed a filter media evaluation that determined the need for anthracite and sand replenishment or replacement. Project work included developing a sampling protocol, collecting core samples of the filter media, analyzing laboratory results, and developing a summary memorandum. Standardization of backwash procedures was planned.
- **Confidential Client Water Management and Treatment Support / Grants NM:** Completed a WTP performance assessment to identify potential ways to enhance the removal of uranium, molybdenum, selenium, sulfate, and TDS, and to reduce waste brine and O&M costs. Performed a condition assessment to estimate remaining useful life of all process equipment and estimate replacement/rehabilitation costs. Developed an excel based tool that depicts water management strategies for various scenarios. Evaluated alternate treatment technologies for enhanced COC removal and treatment of additional process streams. On-going work includes bench, pilot, and full-scale testing of the lime softening process and membrane filtration technologies to improve performance of downstream RO.
- **Confidential Client Water Treatment Feasibility Study / Florence AZ:** Performed a feasibility study to treat industrial process and restoration water for the removal of sulfate, TDS, and metals. Work included an alternatives evaluation supported by Criteria Decision Plus analysis, water quality evaluation, and development of a water balance to meet site water demands and water quality goals. A high density lime, MF/UF, and RO treatment process was selected. On-going work includes preliminary design and cost model development.
- **Confidential Client WTP Operability Assessment / Tuba City AZ:** Identified performance limiting factors affecting operations at a water treatment facility removing co-occurring contaminants (molybdenum, nitrate, selenium, sulfate, and uranium) from groundwater. The operability assessment evaluated all aspects (administrative, design, operations, maintenance, and SCADA) of the treatment process, which consists of ion exchange, sulfuric acid addition, and mechanical vapor recompression. An alternative treatment technologies evaluation was also performed. Project work included reviewing standard operating procedures, operator logs, and historical performance data; conducting site visits; identifying performance limiting factors; and developing a project presentation and final report.



Troy Walker
 Membrane Technology Leader
 Tempe, Arizona

Areas of Expertise

- Seawater Desalination
- Reverse Osmosis
- Microfiltration
- Drinking Water
- Water Reuse
- Operations Management

Professional Record

Mr. Walker is a Senior Associate and the Western Region Water Practice Leader for Hazen and Sawyer. In addition to, and complimentary to these roles, he also acts as the Membrane Technology Leader. He has over 20 years of experience in the planning, design, construction and operations man-

agement of advanced seawater desalination, water, and water reuse facilities. Mr. Walker has a wealth of experience in piloting, detailed design, construction, commissioning and long term operations of membrane treatment technologies focused on the treatment of municipal effluent for industrial use. This has involved an intimate knowledge and management of the intricacies of industrial customer water quality requirements including steel manufacturing, power generation, oil refining and mining applications.

- **WRRF 13-03:** Mr. Walker is the Principal Investigator for WateReuse Research Foundation project 13-03 Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers of a DPR Scheme. The goal of the project is to demonstrate the robustness and reliability of Direct Potable Reuse (DPR) processes and to quantify the impacts of specific critical control points within a DPR system to help overcome this obstacle. The project will utilize the principles of Hazard Analysis and Critical Control Points (HACCP) to identify critical control points that control microbiological and chemical hazards – ensuring a safe, reliable water supply.

This project has identified critical control points (CCPs) for both a full advanced treatment (FAT) membrane based process (MF/RO/UV H2O2/Cl2) and a non-membrane treatment system (O3/BAC/GAC/Cl2) using a HACCP team process. It is also using a combination of both operational and maintenance data from full scale operating facilities, supplemented >>

Mr. Walker has over 20 years of experience in the planning, design, construction and operations management of advanced water, seawater desalination and water reclamation facilities.

Academic Credentials

BE Chemical Engineering,
 University of New South
 Wales, Australia, 1994

Graduate of CO-OP Scholarship Program.

Employment Record

2013-Pres. Hazen and Sawyer, P.C.

2007-2013 Veolia Water Australia

2000-2007 Veolia Water Systems

1998-2000 US Filter/Memcor

1994-2000 Memtec Ltd

Presentations

IWES Membrane Plant Design and Operation Course - Presenter (2007-2012)

Ca-NV AWWA Annual Conference, “Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers for a DPR Scheme” (October 2014)

WateReuse Annual Conference, “Direct Potable Reuse Projects 13-03 (Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers for a DPR Scheme) and 13-13 Development of Operation and Maintenance Plan and Training and Certification Framework for Direct Potable Reuse (DPR) Systems” (September 2014)

American Membrane Technology Association Membrane Technology Conference. “Know When to Hold ‘em, Know When to Fold ‘em. How long will low pressure membranes last?” (March 2014)

South Central Membrane Association, San Antonio, TX, “Mastering Membrane Management: Getting the Best Value from your Membranes in the Long Run (August 2014)

KN/TN AWWA, Chattanooga, TN, “Low Pressure Membrane Filtration Where Have We Been and Where Are We Headed?” (July 2014)

with additional pilot data, to quantify the role of each CCP via Monte Carlo analysis.

- **WRRF 13-13:** Mr. Walker is the Principal Investigator for WateReuse Research Foundation project 13-13 “Development of Operation and Maintenance Plan and Training and Certification Framework for Direct Potable Reuse (DPR) Systems”. This project is aimed at the development of a framework for the key requirements of both operation and maintenance plans, and importantly the training and certification requirements to underpin the skills and knowledge for operations teams that are engaged in direct potable reuse schemes. City of Santa Monica – Reverse Osmosis Treatment Plant Optimization: As Project Manager, Mr Walker provided expert technical advice and planning to troubleshoot and significantly improve the performance of the City’s 8 MGD reverse osmosis facility. This included an economical design and retrofit to ameliorate severe membrane fouling.
- **City of Santa Monica, Reverse Osmosis Treatment Plant Optimization:** As Project Manager, Mr Walker provided expert technical advice and planning to troubleshoot and significantly improve the performance of the City’s 8 MGD reverse osmosis facility. This included an economical design and retrofit to ameliorate severe membrane fouling.
- **Carlsbad Seawater Desalination Plant, Commissioning Review:** Mr. Walker is providing a detailed review of important mechanical completion and commissioning planning for the Carlsbad Desalination Facility, based in San Diego, CA. This leverages from his extensive commissioning and operational experience in seawater desalination.
- **Optimization and Support, City of Beverly Hills, CA:** Mr. Walker has provided operational support for a ground water reverse osmosis system for the City of Beverly Hills.

Experience prior to Hazen and Sawyer

- **Gold Coast Desalination Plant, Gold Coast Australia:** Led the technical elements of operation for a \$1 billion dollar, 35 MGD seawater desalination plant at the Gold Coast, near Brisbane, Australia. The plant provided a drought-proof source of water for the Gold Coast and Brisbane at the height of Australia’s worst drought on record. Mr. Walker provided support during the design phase, oversight of operational monitoring and reporting, training of operators, support of alternative operating strategies at the end of the drought, and implementation of critical control point methodology to ensure consistent water quality.
- **Sydney Desalination Plant, Sydney Australia:** Provided technical support and oversight as Technical Director for Operations of Veolia Water Australia, the plant’s operator. Specifically, provided technical support for the membrane replacement schedule and later membrane preservation strategy as part of long term operations management for the facility. Additionally, oversaw support for energy reduction initiatives during plant operation. Was also responsible for oversight of process and performance monitoring, environmental management, asset management and operator technical training.

AWWA/SWMOA Joint Conference, Newport, CA, “Seawater Design Hurdles” (July 2014)

AZ Water, Glendale, AZ, “Droughts and Flooding Rains, Australia’s Large Scale Water Recycling and Desalination Experience” (May 2014)

SCMA Workshop, Fort Worth, TX, “Microfiltration and Ultra-filtration Tips and Traps” (April 2014)

SCMA Workshop, Alamogordo, NM “Why I Wish I Had a Pilot Plant” (April 2014)

American Membrane Technology Association, Membrane Technology Conference “High Pressure Membrane Plant Design” Workshop (March 2014)

WateReuse Industrial Reuse Conference, “Water Recycling for Industry: The Australian Experience” (December 2013)

University of North Carolina, “Direct and Indirect Reuse” (October 2013)

South Central Membrane Association, South Padre Is, Texas, “Large Scale Desalination: The Australian Experience” (October 2013)

Veolia Water Technical Director’s Conference Asia-Pacific. Presentation on climate impact on water operations in Australia. Shenzhen, China. (2011)

Australian Water Association, Membranes and Desalination Specialty Conference, “Western Corridor Recycled Water Project Update” (February 2011)

IWA Reuse Conference, Presenter, Brisbane Australia “Western Corridor’s Bundamba Advanced Water Treatment Plant” (2009)

American Membrane Technology Association Conference, Memphis Tennessee “Australia’s Western Corridor Recycled Water Project Regulation of an Indirect Potable Recycling Scheme Down Under” (2009)

Selected Publication

Contribution of a chapter to the International Water Association’s book *Milestones in Water Reuse*. Chapter 10 – Western Corridor Recycled Water Scheme; 2013.

Thomas Bradford Reisinger, PE

Senior Principal Engineer



Areas of Expertise

- Microfiltration/Ultrafiltration
- Reverse Osmosis
- Water Reclamation
- Concentrate Treatment
- Membrane Process Optimization
- Pilot operations

Professional Record

Mr. Reisinger has extensive experience with membrane related treatment systems. His experience includes preparation of detailed plans and specifications, developing P&I drawings, plant layout design, bench and pilot testing, pilot system operations, construction services and full scale facility start-up, concentrate management, and process monitoring & optimization. He has supported membrane applications such as municipal drinking water, waste water, and water reclamation and has direct experience with hollow fiber nano/microfiltration, flat plate MBR, reverse osmosis, and electrodialysis reversal. Mr. Reisinger's Arizona experience is further detailed below.

- **City of Scottsdale, Chaparral Water Treatment Plant (WTP) Modified Control System Coordination, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger performed a detailed coordination of modified control strategies for the membrane feed pump station, membrane rapid drain operation, wash water equalization basin, and chemical feed systems. (July 2013)
- **City of Scottsdale, Chaparral Water Treatment Plant (WTP) Backpulse and Compressed Air Modifications, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger analyzed the microfiltration (MF) backwash system pressure surge condition, performed a hydraulic analysis and subsequent system redesign to eliminate surge. The redesign included the mechanical revision of the backpulse piping and pump station and a revised control strategy to correct water hammer in the system. Mr. Reisinger also audited the plant compressed air system demands versus capacity to rectify an insufficient supply issue. The supply issue was resolved by optimizing control set points which included revising the air removal vessels to allow for venturi educator system to provide vacuum air removal to optimize the air consumption and eliminate the need for larger air compressors. The project was completed as a design build project. (August 2011 – September 2012)
- **City of Scottsdale, Chaparral Water Plant – Raw Water Pump Station Retrofit and Control Modifications, Scottsdale, Arizona:** Project Engineer – Project includes review of plant hydraulics and

Academic Credentials

BS Mechanical Engineering,
California Polytechnic State
University, San Luis Obispo,
June 2005

Munich University of Applied Science, (International Exchange Program), Munich, Germany, Fall 2003 to Spring 2004

Professional Engineer: California

Employment Record

2014-Pres. Hazen and Sawyer, P.C.

2006-2014 SPI

2005-2006 IWS

Professional Activities

American Membrane Technology Association

Southwest Membrane Operators Association

Water Reuse

Bay Area Water Works Association

Publications

"Application of RO in Recycled Water Facilities," Brad Reisinger, presented at Southwest Membrane Operator Association Conference, September 2012.

"Failure Modes of UF / MF Hollow Fiber Membranes," Brad Reisinger, presented at American Membrane Technology Association, September 2011.

"Major Manufacturers and New Developments," Brad Reisinger, presented at California – Nevada Section of American Water Works Association, September 2011.

"New Microfiltration Facility: From Concept to Reality," Brad Reisinger, presented at Southwest Membrane Operator Association Conference, February 2010.

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operations, inspection of four 10 mgd split case pumps in the factory, assistance during installation and performance testing. The project required that the controls be revised to eliminate cavitation and damage to the pump station. Mr. Reisinger was responsible for hydraulic analysis, revised control strategy development, and final commissioning. (June 2012 – November 2012)

- **City of Scottsdale, Chaparral Water Treatment Plant (WTP) Operations Support Services, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger assisted city personnel with membrane integrity testing and membrane module replacement of their Zenon ZeeWeed 500 microfiltration system. The Chaparral WTP is a 30 mgd surface water plant consisting of microfiltration followed by granular activated carbon contactors. (March 2010 – April 2010)
- **City of Scottsdale, Central Arizona Project (CAP) Water Treatment Plant (WTP) Expansion Construction Services, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger reviewed project mechanical, O&M, and lesson plan submittals. Assisted contractor with information requests. Attended weekly construction progress meetings. Inspected construction site monthly to verify compliance with the design. Created system operation and maintenance manual. Prepared and delivered system training seminar. Oversaw plant start-up and commissioning including data collection used to evaluate baseline membrane performance to verify performance requirements had been achieved. Analyzed start-up data which was later integral in warranty negotiations for the MF system. The CAP WTP is a 20 mgd surface water plant consisting of dissolved air flotation as pretreatment to Siemens CP pressurized MF system followed by granular activated carbon contactors. (January 2008 – August 2010)
- **City of Scottsdale, Water Campus Advanced Water Treatment (AWT) Facility Operations Support Services, Scottsdale, Arizona:** Project Engineer – Assisted city personnel with reverse osmosis (RO) membrane element replacement. Mr. Reisinger along with 2 others replaced three hundred twenty (328) eight 8”x 60” RO elements in two 24:10:5 array RO trains in two 12 hour shifts. (December 2009)
- **City of Scottsdale, Chaparral Water Treatment Plant (WTP) Operations Support Services, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger evaluated possible causes and solutions for snail infestation in the microfiltration (MF) facility. Developed complete plant hydraulic model to locate flow points with insufficient fluid velocity to keep particles in suspension. Coordinated an automatic strainer inspection by a factory service technician to verify strainer integrity and proper operation. Developed a revised automatic strainer maintenance schedule. The Chaparral WTP is a 30 mgd surface water plant consisting of microfiltration followed by granular activated carbon contactors. (November 2008 – March 2009)
- **City of Scottsdale, Central Arizona Project (CAP) Water Treatment Plant (WTP) Expansion Detailed Design, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger developed the detailed design of a 20 mgd Microfiltration (MF) system treat surface water from the CAP Canal including detailed design report preparation and specification development. Performed hydraulic analysis of MF backwash recovery and CIP chemical neutralization systems. Performed hydraulic equalization analysis for the MF and MF Backwash flows. Designed mechanical layout for the microfiltration facility including MF system, compressed air system, CIP system, and the chemical feed system. Coordinated in-house p&id drawings with MF manufacturer’s p&id’s. Coordinated MF process mechanical design with civil, structural, electrical, and architecture disciplines. The CAP WTP is a 20 mgd surface water plant consisting of Dissolved Air Flotation as pretreatment to Siemens CP pressurized MF system followed by granular activated carbon contactors. (January 2007 – December 2007)
- **Tucson Water, Water Quality and Implementation Program Phase II – Bench Scale and Pilot Testing, Tucson, Arizona:** Project Engineer – Mr. Reisinger helped develop a Reverse Osmosis (RO) membrane flat sheet test protocol. Performed flat sheet tests on six commercially available RO membranes and used the data obtained to verify that the recommended membrane had the best salt rejection at the lowest operating pressure. Performed budgetary analysis comparing concentrate management and disposal costs as a function of increased system recovery. (December 2007 – January 2008)

- **City of Maricopa, Maricopa Groves Water Treatment Plant Design, Maricopa, Arizona:** Project Engineer – Mr. Reisinger worked on the detailed design of a 5.0 mgd Microfiltration (MF) surface water treatment facility. Designed granular activated carbon slurry transport system. Prepared plant hydraulic models as well as plant overall flow profiles and assisted with the mechanical layout. Provided submit-tal review of the MF package for specification compliance. (June 2006 – February 2007)
- **City of Scottsdale, Site 32 Onsite Chlorine Generation Evaluation and Facility Modifications, Scottsdale, Arizona:** Project Engineer – Project includes evaluation of two 250 pound per day on-site chlorine generation systems to replace a chlorine gas system. The project ultimately ended up with sodium hypochlorite addition system that is convertible to a OSCG system in the future. Mr. Reisinger responsibilities included design review, control strategy development, and development of the operation and maintenance manual. Project was delivered as a design-build project. (March 2011 – October 2012)
- **City of Scottsdale, Site 7 Arsenic Treatment Facility Piping Modifications, Scottsdale, Arizona:** Project Engineer – Project includes design and installation of a control valve and flow meter for controlling bypass water for an Arsenic removal system. Mr. Reisinger responsibilities included design review, control strategy development, and development of the operation and maintenance manual. Project was delivered as a design-build project. (January 2012 – October 2012)
- **City of Goodyear, Well 12 B Arsenic Removal Facility, Goodyear, Arizona:** Project Engineer for Intelligent Water Solutions – Mr. Reisinger provided operations support for a 1.0 mgd well head arsenic removal demonstration facility, collected and analyzed data used to determine ferric chloride dose rates, microfilter fouling rates, and cleaning schedule. Prepared the startup/shutdown and CIP chapters for the O&M manual. Helped to develop standard skid design based on data collected during pilot. (December 2005 – June 2006).
- **City of Phoenix, SROG Salinity Research on Concentrate Management Pilot Demonstration Project, Phoenix, Arizona:** Project Engineer – Mr. Reisinger assisted with design, operation and implementation of a pilot program to evaluate treatment processes for high recovery and concentrate minimization. Responsible for Pilot design, P&ID drawings, treatment process operating and testing protocols and reviews, membrane system protocols, literature review, data analysis and reports. (May 2010 – March 2013)
- **City of Phoenix, Western Canal Pilot Project, Phoenix, Arizona:** Project Engineer – The goals of the pilot were two fold. The pilot treated Salt River Project canal water and/or local brackish ground water, first, to verify the effectiveness of the process on the two source waters, and second to verify the target goal of 92% to 95% overall system recovery. Mr. Reisinger developed pilot protocols for the RO and MF systems. Prepared literature review focusing on membrane technology and its application to potable water treatment. Analyzed bench scale data to verify membrane selection for the project. Developed p&id drawings for a 50 gpm pilot system consisting of microfiltration (MF) as pretreatment to reverse osmosis (RO) with lime softening followed by a secondary RO on the primary RO concentrate stream for concentrate recovery. Assisted with start-up of both the primary and secondary RO systems, analyzed operating data to track RO performance. Developed the final report summarizing the membrane system operation. (July 2007 – February 2009)
- **Tucson Water, Water Quality Improvements and Evaluation Project, Tucson, Arizona:** Project Engineer – Mr. Reisinger provided a comprehensive membrane system evaluation for rehabilitation of Hayden Udall Water Treatment Plant with MF and RO. Provided a treatment process evaluation of treating CAP water or recovered water with RO and what the maximum recovery would be achieved. Evaluated the concentrate management alternatives including evaporation, augmented evaporation, V-SEP and brine concentrators. The treatment alternatives capital and operations costs were determined and a final process selection was made. The cost information was used in a community out-reach program to assess if the community would pay for lower TDS water. (May 2005 – January 2008)

- **Tucson Water, Water Quality and Implementation Program Phase I-Tucson Water Salinity Study, Tucson, Arizona:** Project Engineer – Mr. Reisinger contributed research for Tucson Water’s 50 year plan; “Decision H2O” to treat Central Arizona Project water to 450 or 650 mg/L TDS. Analyzed cost models for several brine disposal options including evaporation ponds, distillation, vibratory shear enhanced processing (VSEP), and deep well injection. Prepared slides summarizing four different brine treatment options for a presentation to City of Tucson mayor and counsel. Prepared budgetary quotes for pilot skids to demonstrate the four brine treatment options. (August 2006 – December 2007)
- **City of Scottsdale, Water Campus Advanced Water Treatment (AWT) Facility Phase IV Expansion Construction Services, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger reviewed project mechanical submittals. Assisted contractor with information requests. Performed microfiltration unit piping weld inspection. Developed the reverse osmosis control description. Worked with the City, the contractor, and the membrane manufacture to trouble shoot and correct errors between the control system and the microfiltration system CIP system. (July 2010 – December 2013)
- **City of Scottsdale, Water Campus Advanced Water Treatment (AWT) Facility Phase IV Expansion Design, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger developed equipment specifications and reviewed mechanical drawings. Designed large diameter reverse osmosis pressure vessel supports. Re-viewed system mechanical design. This project will increase the overall production capacity of the AWT facility from 14 to 20 mgd. The AWT consists of microfiltration, reverse osmosis, decarbonation and lime stabilization to treat tertiary effluent for ground water recharge and irrigation. (August 2009 – December 2009)
- **City of Scottsdale, Chaparral Water Treatment Plant (WTP) Operations Support Services, Scottsdale, Arizona:** Project Engineer – Mr. Reisinger assisted plant operations staff with clean water flux testing on new and existing microfiltration (MF) membranes. Evaluated performance of membranes that had been stored long term in a low concentration chlorine solution. Assisted the city with developing a long term membrane performance monitoring program. The Chaparral WTP is a 30 mgd surface water plant consisting of MF followed by granular activated carbon contactors. (May 2011)

Robert Boysen, PE Engineer



Areas of Expertise

- Microfiltration
- Reverse Osmosis
- Drinking Water
- Water Reclamation
- Concentrate Treatment
- Membrane Process Optimization

Professional Record

Mr. Boysen is a chemical engineer who specializes in water and wastewater related projects. His experience includes process modeling, pilot testing, process optimization, plant operation, operational support, process, I&C and mechanical system design, safety and risk assessment, construction project support and facility start-up. Key constructed projects include the City of Scottsdale Water Campus AWT Expansion, Enaville Water Treatment Facility and Paradise Valley Arsenic Removal Facility.

Mr. Boysen has experience and expertise with process modeling and optimization.

- **CITY OF SCOTTSDALE, Water Campus AWT Expansion > Scottsdale, AZ:** Project Engineer – The City expanded the Water Campus AWT to provide additional water production capacity from their MF and RO systems. The expanded system produces 23.6 MGD of MF filtrate and 20 MGD of RO permeate. Mr. Boysen was the lead process/mechanical engineer for the microfiltration system expansion design, which employed two separate detailed MF system designs as an alternative to the conventional membrane pilot test/procurement approach. During this project, Mr. Boysen also conducted a full scale pilot study of the RO system, which tested RO rejection of micro constituents under variable feed water pH conditions.
- **CITY OF GOODYEAR, Bullard Water Campus and Well 12B RO Systems > Goodyear, AZ:** Project Engineer - The Bullard Water Campus is a brackish water RO system designed to produce 5.6 mgd of blended finished water. Well 12B is a 1 MGD well site RO system. During this project Mr. Boysen designed the chemical feed systems and provided general design support for the RO systems. He also developed the plant control narrative for the support systems.
- **MIAMI DADE WATER AND SANITATION DISTRICT, South District Water Reclamation Plant > Miami, FL:** Project Engineer – Mr. Boysen

Academic Credentials

BS Chemical Engineering,
University of Wyoming,
2003

Professional Engineer: Arizona, Wyoming

Employment Record

2014-Pres. Hazen and Sawyer

2012-2013 Water Standard, Houston,
Texas

2006-2012 Separation Processes, Inc,
Tempe, Arizona

2004-2006 Damon S. Williams
Associates (now Jacobs),
Phoenix, Arizona

1998-2004 B.C. Technologies, Laramie,
WY

Associations

SPE

AWWA

AMTA

Past President and Board Member, Arizona Chapter of the American Institute of Chemical Engineers: 2007-2012

Publications

Mr. Boysen has co-authored and presented over 30 publications

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provided a technical review of the MF process design that included detailed process modeling to review support system sizing.

- **FREELAND WATER AND SEWER DISTRICT, New Sewage Collection and Treatment System > Freeland, WA:** Project Engineer – Mr. Boysen provided conceptual MBR process design review and helped develop a preliminary capital and O&M cost estimate for the project. This work included the use of Biowin for biological treatment process review.
- **GLOBAL WATER, Palo Verde Utility Company Water Campus 1 Phase 3 Expansion > Maricopa, AZ:** Project Engineer - Global Water planned to expand a 3 MGD SBR wastewater treatment facility to 4.25MGD with an additional MBR process train. The project was expected to be delivered through a design, bid build process but was not implemented. The SBR/MBR process design was finalized and procurement drawings and specifications were prepared. Mr. Boysen was involved with procurement specification, preliminary site/equipment layout and membrane filtration system procurement process and instrument diagram development.
- **SUB-REGIONAL OPERATING GROUP, Salinity Research on Concentrate Management Pilot Demonstration Project > Scottsdale, AZ:** Project Engineer – During this project, a process train was developed to improve water recovery in municipal water reuse facilities. The process design, which used ozone, biologically active filters, electro dialysis reversal and ion exchange, is intended primarily for enhanced water recovery of existing reverse osmosis concentrate streams. Secondly, the project tested an electrodialysis metathesis process that could be used to separate cation and anion constituents as an alternative to reverse osmosis. Mr. Boysen has provided technical and operational support to the project.
- **POLAR BEAR WATER TREATMENT, LLC, Pond Liner Design Evaluation > Wamsutter, WY:** Project Engineer – Mr. Boysen provided a technical review of current pond liner technologies for a new Freeze-Thaw/Evaporation FTE® produced water, drilling mud and flowback management facility.
- **RAYNE, Centralized Regeneration Salt and Water Reclamation Project > Phoenix, AZ:** Project Engineer – The project evaluated treatment alternatives and costs for treating Ion Exchange Blow-down to recover the salt and water to minimize discharge to the sewer. Project involvement included process design and pilot protocol development.
- **CRYSTAL SOLUTIONS LLC, BC Technologies, LTD > Laramie, WY:** Chemical Process Engineer. Mr. Boysen helped to commercialize and optimize the Freeze-Thaw/Evaporation FTE® process for oilfield brine, produced water and hog farm waste management. Responsibilities included monitoring operational data, supervision of plant operators, operation of FTE® facilities, fabrication of control panels, supervision of optimization projects and design of new facility concepts.
- **OTAY WATER DISTRICT, Rancho Del Rey Wellhead Treatment Plant Feasibility Report > San Diego, CA:** Project Engineer – SPI performed a feasibility study of treatment alternatives for boron and TDS removal at an existing well. Alternatives considered included use of RO with blending, use of seawater RO membranes with blending and a combination of RO and IX. Mr. Boysen performed conceptual sizing and cost development.
- **CITY OF VALLEY CITY, Reverse Osmosis Pilot Study > Valley City, ND:** Project Engineer – Mr. Boysen provided installation, start-up and training during the RO pilot test.
- **CITY OF GOODYEAR, Well H7 RO System > Newland Communities, Goodyear, AZ:** Project Engineer - During this project, SPI designed two separate 1 MGD brackish water RO treatment facilities for a housing development located south of Goodyear. Although the project was not implemented, the detailed designs were completed and may be implemented at a future date. During this project, Mr. Boysen was directly responsible for the detailed design and specification of RO support systems including pre and post treatment chemical addition and pretreatment media and cartridge filtration.



Paul C. Bassette, PE, BCEE
Senior Associate

Areas of Expertise

- Energy Conservation and Renewable Energy
- Project and Design Management
- Membrane and UV Treatment Technologies
- Pump Station Design

Professional Record

Mr. Bassette specializes in the design and construction administration of water and wastewater facilities. His experience includes project management; wastewater and water treatment unit processes design; pump station design; wastewater collection and water distribution system design; startup and operator training; design of lined water impoundments; and preparation of grading and drainage plans. He has managed energy studies, developed designs for energy-conserving improvements, and provided assistance to Owners for energy performance contracting. His previous experience includes:

- **Wastewater Collection, Treatment, and Reuse Systems, Buckskin Sanitary District, La Paz County, AZ:** Project engineer for design to serve a community of 3,500 along the Colorado River. The collection system used both small-diameter pressure sewers and gravity sewer systems.
- **Sun City/Youngtown Water Supply Connections, Citizens Utilities, Sun City, AZ:** Managed the design for three connections from the Sun City water distribution system to the Youngtown distribution system. The Sun City system will supply the Youngtown system through the interconnects consisting of pressure reducing valves, isolation valves and piping.
- **Lift Station and Sewer Improvements, City of Casa Grande, AZ:** Assisted with the design of a new 520-gpm package lift station, 270 linear foot of 8-inch force main and 1,200 linear foot of 15, 18 and 21-inch sewer line. In addition, served as resident construction observer. The lift station will open the area for further development and serve the new, Casa Grande Industrial Park.
- **Sanitary Sewer Main Construction, City of Casa Grande, AZ:** Resident construction observer for approximately 3.5 miles of 8-inch through 18-inch sanitary sewer line which will relieve existing sewer lines and provide future capacity.
- **Chemical Feed Facilities at Surface Water Treatment Plant, City of Chandler, AZ:** Project engineer for new design and modifications to chemical feed facilities for the 45-mgd plant. The chemical facilities included a new carbon dioxide feed system to reduce raw water pH for enhanced coagulation; new polymer feed systems for coagulant aid, filter aid, sludge thickening, and plate settling; and upgrading the alum and,

Academic Credentials

BS Montana State University,
Construction Engineering,
1984

Professional Engineer: California, New
York, Virginia, Maryland

Board Certified Environmental Engineer
(BCEE)

Certified Construction Contract Administra-
tor (CCCA)

Certified Construction Documents Tech-
nologist (CDT)

Employment Record

2014-Pres. Hazen and Sawyer, P.C.

1988 - 2014 Malcolm Pirnie/ARCADIS

1985 - 1988 Wilson and Company

Professional Activities

Water Environment Federation

VA Water Environment Association

American Academy of Environmental
Engineers

Publications

Ostapczuk, R., Bassette, P.C., Bevington, G.,
Dassanayake, C., "Recuperative Thickening:
Decoupling the SRT from the HRT Re-
duces Capital Expenditures and Increases
Biogas Production for CHP Utilization,"
presented at the 84th Annual Confer-
ence of the Water Environment Federation
(WEFTEC 2011), Los Angeles CA, October
15-19, 2011.

Ostapczuk, R., Bassette, P.C., Bevington,
G., Dassanayake, C., Smith, J., "Achieving
Zero Net Energy Utilization at Municipal
WWTPs," presented at the Water Environ-
ment Federation (WEF) Energy Manage-

Caustic feed systems. The upgrades consisted of the installation of chemical storage tanks, transfer pumps, feed pumps, piping appurtenances, and control systems.

- **Surface Water Treatment Facility, City of Chandler, AZ:** As project engineer, responsible for construction administration tasks, including shop drawing and operations and maintenance (O&M) manual review and engineering clarifications for construction of a 30-mgd water treatment facility.
- **Arrowhead Ranch Infrastructure, City of Glendale, AZ:** Design of 1.5 miles of divided, four-lane roadway, 1.0 mile of 12-inch sanitary sewer line and nearly 1.0 mile of 12-inch waterline; part of a \$23 million infrastructure, capital improvements program for the city.
- **91st Avenue WWTP Upgrade and Expansion, City of Phoenix, AZ:** Managed the design for a 30 mgd expansion for the 91st Avenue WWTP. The project consisted of the addition of two bar screens, four grit basins, chemical feed equipment, two 130 feet diameter primary clarifiers, two 100 feet by 300 feet aeration basins, two 180 feet diameter secondary clarifiers, one 3 million gallon digester, and expansion of the sludge thickening and dewatering facility. Total construction cost of the improvements is approximately \$64 million.
- **Litchfield Airport Storm Drainage Design, City of Phoenix, AZ:** Design and construction plans for 4,500 linear feet of 72-inch storm drain.
- **Secondary Sedimentation Facilities at 91st Avenue Wastewater Treatment Plant, City of Phoenix, AZ:** Project engineer for design of new, and modifications to existing secondary sedimentation facilities for the 154-mgd plant. The new secondary facilities included the design of four 180-ft diameter secondary sedimentation basins, a 68-mgd RAS pump station, WAS and scum pump stations, and interconnecting piping and channels. The RAS pump station consisted of five 66-in. diameter screw pumps, each rated at 17 mgd. The modifications to the secondary facilities included collector drive improvements and inlet modifications to the rectangular sedimentation basins and WAS pump modifications.
- **Squaw Peak Water Treatment Plant Upgrade and Expansion, City of Phoenix, AZ:** Project engineer for development of alternatives and design of an 180-mgd raw water pump station, plant, capacity improvements, flocculation sedimentation basin improvements, backwash pump station, filter valve and gate rehabilitation, distribution booster pump station, and reservoir flow distribution improvements for the upgrade and expansion of the 180-mgd plant. The raw water pump station included four pumps rated at 30 mgd and three pumps rated at 20 mgd with surge control facilities. Energy efficient alternatives were considered for the pump station designs as motor sizes ranged from 300 hp to 500 hp.
- **Sunnyslope Elementary School Drainage, City of Phoenix, AZ:** Drainage study technician responsible for making design changes for off-site drainage system improvements involving approximately 300 ft of reinforced concrete pipe, curb and gutter, Washington School District.

ment Specialty Conference, Chicago IL, August 1-3, 2011.

Ostapczuk, R., Bassette, P.C., Bevington, G., "Gloversville-Johnstown Joint Wastewater Treatment Facility Co-digestion Leads to a Sustainable Future," presented at the Water Environment Federation (WEF) Residuals and Bio-solids Specialty Conference, Sacramento CA, May 23-25, 2011.

- **Central Arizona Project Water Treatment Plant Expansion, City of Scottsdale, AZ:** Project engineer for design of new chemical facilities for the 55-mgd plant, which included new, carbon slurry, polymer, aluminum sulfate, sodium hydroxide, sulfuric acid, and chlorine systems. The design included bulk storage, chemical feed, and containment facilities, and a chlorine scrubber.
- **Central Arizona Project Water Treatment Plant, Raw Water Pump Station and Transmission Main, City of Scottsdale, AZ:** Project engineer for design of a new 55-mgd pump station and transmission main. The preliminary design for the facility evaluated both natural gas and electricity as an energy source for the facility. The final pump station design included four vertical turbine pumps, two driven by 700-hp electric motors and two driven by 700-hp natural gas engines. The transmission main consists of approximately 2 miles of 60-inch diameter pipelines.
- **Groundwater Treatment Facility Pipeline Design, City of Scottsdale, AZ:** Project engineer for design of 12-inch through 30-inch pipelines to transfer contaminated groundwater to the 13-mgd facility for the removal of volatile organic contaminants (VOCs).
- **Reservoir No. 1, Pump Stations No. 55B and No. 130, City of Scottsdale, AZ:** Managed the design for the demolition and reconstruction of a 5 million gallon reservoir and two new pump stations. The reservoir is a, cast-in-place concrete tank that serves the Central Arizona Project Water Treatment Plant. Pump Station No. 55B is a booster pump station with an 18 mgd design, capacity with five 250 hp pumps serving the north zones for the City of Scottsdale. Pump Station No. 130 has a design, capacity of 12 mgd with three 100 hp pumps that deliver water from the, CAP WTP Raw Water Transmission Main to the Water, campus, a wastewater reclamation facility. The raw water will be used to supplement the irrigation demands and will be treated for groundwater recharge. An economic analysis was performed to determine the optimum pump and pipeline sizes.
- **Bisbee-Douglas International Airport (BDI) Wastewater Treatment Facility Upgrade, Cochise County, Bisbee, AZ:** As engineer, prepared plans and specifications and performed construction-related services for a 0.32-mgd upgrade of a lagoon waste treatment facility with chlorination disinfection. The facility serves a new 1,500-man prison and an existing airport in Cochise County.
- **Bisbee-Douglas International Airport (BDI) Water System Improvements, Cochise County, Bisbee, AZ:** As engineer, prepared plans and specifications for the upgrade of an existing 1100-gpm well, a new 1,100-gpm well, 8-inch, 10-inch and 12-inch waterlines, chlorination facilities, and standby power facilities to serve a new 1500-man prison, a, cannery, and the BDI airport in Cochise County.
- **Superior Copper Mine Drainage Study, Magma Copper Company, Superior, AZ:** Project engineer for drainage study of a 1400-acre site that included an active underground hard-rock mining operation and an on-site milling operation. The study included evaluation of specific rainfall events derived from historic rainfall events; definition of drainage basins and flow characteristics, and evaluation of surface flow routing and on-site storm water retention.
- **Durango Sewer Line, Maricopa County, Durango, AZ:** Designed and served as resident construction observer for the installation of 8 and 12-inch sanitary sewer line at the Durango Complex.
- **Sludge Storage Basin Design at the Ina Road Water Pollution Control Facility, Pima County Wastewater Management Department, Tucson, AZ:** Project engineer for design of a 1.5-MG lined and covered sludge storage basin with sludge truck loading facilities.
- **Arizona State Prison (ASP) - Perryville Wastewater Treatment Facility Expansion, State of Arizona Department of Corrections, Perryville, AZ:** Design and specifications for the expansion of a 0.5-mgd wastewater treatment facility, including a pump station, screening facility, aeration system and clarifier.

- **Arizona State Prison Safford Wastewater Treatment Facility Upgrade, State of Arizona Department of Corrections, Safford, AZ:** Performed study, design, specifications, construction services and O&M manual for a 0.125-mgd upgrade of a lagoon wastewater treatment facility with chlorination disinfection.
- **Sewer Treatment Plant Evaluation, Williams Air Force Base, Mesa, AZ:** As project engineer, evaluated the 500,000-gpd sewer treatment plant at the base. The study of the two-stage trickling filter plant included evaluating the plant for compliance with regulatory requirements and operational deficiencies, and developing a repair, modifications program.