



## *Memo*

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To: Board of Directors  
From: Jordan Dietz, General Manager  
Date: January 19, 2021  
Subject: Electra Well

The Electra Well which was drilled at the end of 2017 was found through water quality analysis to have high amounts of Gross Alpha Radiation caused by groundwater flowing across plates of Subsurface Uranium. This well is thought to be capable of producing and sustaining at least 30 gallons per minute. Multiple companies provided quotes for systems that would provide Gross Alpha Removal on-site.

- AdEdge Technologies has provided an updated and finalized quote of **\$42,000.00**.

This quote includes the costs associated with the delivery and installation of the removal system, minus taxes. Additionally, AdEdge has provided vessel replacement costs for exchanging uranium-filled vessels, which is expected annually with the peak flow rate of the well.

- 3 vessels will need to be exchanged each year, and total **\$15,000.00 per year**.

Excluded are the costs of site-related structures to house the equipment, and any plumbing components relating to the well itself.

Additional costs will include the construction of a well house, retaining wall and driveway as well as any in-house plumbing requirements. No quotes have yet been solicited for the construction needs or materials costs for any portions to be installed by staff. Quotes will be obtained after final drawings and information are received from AdEdge, which will occur upon contract agreement.

- Site construction and paving costs are estimated by prior work, at **\$30,000.00**.

**Recommendation:** Approve the quote as provided by AdEdge Technologies for purchase of the Gross Alpha removal system as listed. This will initiate the process, allowing staff to begin soliciting quotes for construction and materials with the goal of bringing Electra Well online within the year.

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# Crestline WD; Crestline, CA - Electra Well - 30gpm - U

## Site Profile

Intelligent thinking.....clean water

### Contact Information

End User / Utility:	Crestline Water District
Site / Well Identity / Location:	Crestline, CA
Local Engineer / Firm:	NA
Target Date for Installation:	TBD
Funding Source:	Private
Treatment Goals:	reduce gross alpha, uranium

Date:	10/1/2020
Project Contact:	Jordan Dietz
Contact Phone:	909-338-1727 ext. 224
Contact Email:	<a href="mailto:jwdietz@cvwater.com">jwdietz@cvwater.com</a>
Rep Contact:	C-M Equipment - Mike Anderson
Rep Phone:	415 250 8122
Rep Email:	<a href="mailto:mike@andersonz.com">mike@andersonz.com</a>

### Site Information

System Type / Application:	Municipal
Population Served:	500
Number of Connections:	(for municipal applications)
Number of Wells:	1
Max Flowrate (gpm):	30 GPM (design flowrate)
Ave Flowrate (gpm):	20 GPM
Ave Gallons per Day:	32,400
Ave Well Runtime (hr/day):	18
Operating Pressure (psi):	110
Discharge Options Available:	Not Available
System Redundancy Required:	No
Existing Treatment or Disinfection:	CIO2 Feed
Available Electrical Supply:	480 v 3phase
Atm Storage Tank Present / Size:	None
Hydropneumatic Tank Present / Size:	None
Building Present / Available Space:	TBD will build as needed
Additives (Phosphates, Fluoride, etc.):	

### Site Specific Notes:

Existing CLO2 injection for Disinfection should be moved post-treatment.  
 Assumed that all uranium is contributing to 100% of gross alpha at site.  
 Bed volume projection is based on 15 lb site disposal limit.  
**FLOW**  
 Well Head > Treatment > CIO2 > Distribution

### Other Contaminants in lab report - Sample 2-21-18

Potassium  
Zinc

### Site Shipping Address:

Prepared by: Reviewed by:

### Additional Water Quality Information:

Parameters	Water Chemistry
pH	7.8
Total Arsenic	ND mg/L As
Arsenic (III)	mg/L As(III)
Total Sulfides	mg/L Total Sulfides
Alkalinity	97 mg/L (as CaCO <sub>3</sub> )
Bicarbonate	120 mg/L (as CaCO <sub>3</sub> )
Hardness	76 mg/L (as CaCO <sub>3</sub> )
Calcium	27 mg/L Ca
Magnesium	2.4 mg/L Mg
Phosphate	mg/L PO <sub>4</sub>
Silica	mg/L SiO <sub>2</sub>
Vanadium	ND mg/L V
Iron	ND mg/L Fe
Manganese	ND mg/L Mn
TOC	mg/L TOC

Parameters	Water Chemistry
Ammonia	mg/L NH <sub>3</sub> -N
Nitrate	0.46 mg/L NO <sub>3</sub> -N
Sodium	15 mg/L Na
Chloride	6.4 mg/L Cl
Sulfate	3.1 mg/L as SO <sub>4</sub>
Fluoride	ND mg/L F
Total Dissolved Solids	140 mg/L TDS
Total Suspended Solids	mg/L TSS
Gross Alpha	65 pCi/L
Combined Radium	pCi/L Ra 226/228
Uranium	65 pCi/L
Turbidity	1 NTU
Temperature	°F
Dissolved Oxygen	mg/L DO
Chromium VI	ND mg/L Cr(VI)

rev 01.11.18

### MOD92-IX Uranium

AdEdge Packaged System:	MOD92-IX-1447EX-6-MVH-LL
Number of Vessels:	6 - 14 in Diameter x 47 in Ht
Configuration:	Series
Media Type:	AD92
Total Qty of Media (cu ft)	19.5 cuft
System footprint:	TBD
Backwash Frequency:	Not Applicable

Treatment Goals:	Uranium ≤ 0.02 mg/L
Hydraulic Loading Rate:	9.4 gpm/sqft
Flow Rate:	30 gpm
Avg gallons/day:	32,400 gal/day
Hydraulic Utilization %:	75%
Bed Volume:	248,599
Est. Gallons before replace:	18,130,329 gallons
Est. Media life (Lead Vessel):	1.5 years (est frequency of changeout)

### System Costs

	Capital Costs
Packaged MOD92-IX System:	Included
Equipment Shop Drawings:	Included
AdEdge Startup & Training:	Included
Engineering / Permitting:	By Others
Site Installation:	By Others
Freight, taxes (if applicable):	Not Included
<b>Total Capital costs:</b>	<b>\$42,000</b>

	EST. Annualized O&M
Replacement Media and Disposal:	\$5,193 (New Lead Vessel, Media, and Disposal)
OPEX \$/1000 gal treated:	<b>\$0.44</b>

# AdEdge Water Technologies - Scope of Supply

Crestline WD; Crestline, CA - Electra Well - 30gpm - U



## AdEdge Ion Exchange System for Uranium Removal

Chuck Guzelli, Technical Sales Manager - West  
818-966-8474  
cguzelli@adedge.com

10/1/2020

		Parameter	Design	
		Model	MOD92-IX-1447EX-6-MVH-LL	
Item	Detail	Design	Supply	Install
	<b>MOD92-IX-1447EX-6-MVH-LL, Modular Composite Fiber System, Manual Operation</b> System with Vessels and Valving designed to run in series. System is shipped Pressure and Flow Tested, and Ready for Installation.	AdEdge	AdEdge	Others
<b>A</b>	<b>Composite Pressure Vessels and Media</b> Six (6) 14-inch x 47-inch Composite Vessels Vessels Arranged for Series Operation (3 Lead - 3 Lag) Sch 80 PVC Internal Inlet Distributor and Sch 80 Hub and Lateral Design Uranium Exchange Media (AD92), 3.25 cuft/vessel	AdEdge	AdEdge	Others
<b>B</b>	<b>Process Valves, Piping, and Instrumentation</b> 304SS Hydraulic Panel with System Inlet/Outlet Pressure Gauges and Sample Ports, One (1) per system Inlet/Outlet Isolation Valves per Train 2-inch Inlet/Outlet Connections Two (2) 0 to 200 psi Pressure Gauges on Each Train One (1) Rotameter on Each Parallel Train in the System for Flow Balancing One (1) Diaphragm Valve on Each Parallel Train in the System Local Sample and Isolation Valves <i>*Field piping to be completed by installer</i>	AdEdge	AdEdge	Others
<b>C</b>	<b>Bag Filtration for Fines Removal</b> One (1) 2" BFN-12 Stainless Steel Bag Filter Housing Rated @150 psi Pressure Gauge and Sample Valve Five (5) 5-Micron Polyfelt Bag Filters Skid Mounted with Bypass/Blend and Flow Meter	AdEdge	AdEdge	Others
<b>D</b>	<b>Included Field Services and Miscellaneous</b> O&M Manuals (+1 Hardcopy, +1 Electronic Copy) including Engineering Drawings, Design Report, and Control Description System Commissioning Plan and Coordination of Installation with Installer (Pre-Startup) System Startup and Commissioning On-Site Including Media Loading Supervision and Initial Media Flush Two (2) x 8 hour Days Included for Start-Up and Training; Additional Work Billed on Time and Materials Basis Operator Training During System Startup	AdEdge	AdEdge	NA
<b>E</b>	<b>Factory Testing</b> Factory Acceptance Testing in accordance with AdEdge QC procedures and SOPs Hydraulic and Mechanical Testing to Ensure System Meets Requirements Pressure Testing per AdEdge Standard Procedures to Test for Leaks	AdEdge	AdEdge	NA
<b>F</b>	<b>Warranty and Maintenance</b> Standard 1-year Equipment Warranty	NA	AdEdge	NA
<b>G</b>	<b>Freight for Media, Sub-Fill, and System</b>			Not Included
<b>H</b>	<b>Taxes (end use, sales or duty taxes as applicable)</b>			Not Included

### Notes, Clarifications and Exceptions

- AdEdge will coordinate closely with Installer and the Engineer on all equipment and design related items
- System will be shipped on a flatbed trailer / dry van for offloading by personnel other than AdEdge personnel with appropriate equipment and trained operator
- No seismic engineering or seismic related design or equipment modifications are considered in the pricing; can be incorporated as appropriate for the project
- Costs of metal components, especially steel, in our system are subject to change due to the volatilities of market pricing and imposed taxes and tariffs, therefore AdEdge reserves the right to adjust pricing to pass along any such increases.
- AdEdge will request a 48-hour delivery window for treatment equipment delivery. AdEdge will closely coordinate with the customer/contractor during system shipment.
- Treatment System does not meet American Iron & Steel (AIS) requirements. AIS requirements can be met upon request at an additional cost.
- Delays / Schedule: AdEdge has presented its offer and firm pricing in this Purchase Agreement for a system that will be fabricated within provided project specific schedule. If after execution of the contract, Purchaser delays the equipment fabrication for whatever reason beyond four (4) months (including that from late payments) AdEdge reserves the right to assess reasonable escalation charges in the form of a change order to the project at the rate of 1% of the contract value per month for each month the project is delayed after four (4) months and/or adjust prices to pass on materials cost increases which exceed 5% incurred due to customer fabrication delays over four (4) months

### Items Supplied By Others / Contractor

- Interconnecting pipe to the system, appropriate electrical connections to AdEdge Equipment
- Pressurized water supply for use during start-up
- Non-AdEdge system related site, civil, or structural engineering or support costs from Owner
- Safety equipment as required for media loading, startup/commissioning
- Offloading, storage and placement of all equipment and media
- Site work and any building structure / facility or shade structure to be provided; HVAC
- Construction of structural concrete pad as necessary for treatment equipment provided by AdEdge
- Anchoring Equipment, tanks and other equipment to the building's foundation/structural pads
- Dedicated power supply to AdEdge equipment; Interconnecting control and instrumentation wiring to control panel
- Interface with Regulators / Permitting and all permits for successful completion of the project

### Confidentiality Notice

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## EXPERIENCE AND QUALIFICATIONS



# Company Overview



Founded in 2002 and headquartered just north of Atlanta, Georgia, AdEdge Water Technologies specializes in the design, development, fabrication and supply of water treatment solutions, specialty medias, legacy and innovative technologies that remove a wide range of contaminants from water. Our management team has more than 300 combined years of experience in the water treatment industry.

Our mode of work and technologies allow our customers to understand how to manage the elements in a variety of industries with outstanding results. These industries include drinking water, industrial process, mining, dewatering, construction, chemical, remediation and general tertiary wastewater treatment.

We have extensive experience in the removal of arsenic, iron, manganese, hydrogen sulfide, fluoride, nitrate and uranium from water, and we've sold hundreds of water systems ranging from 5 gpm to over 20 MGD in the country and around the world including Canada, India and countries in Africa and Latin America.

We recently expanded our engineering and manufacturing capabilities to design and build all systems in our manufacturing facility. To date the U.S. Environmental Protection Agency (EPA) has awarded us 12 arsenic demonstration projects, more than any company in the industry. We work with 75% of the top 12 design firms in the United States and hundreds of engineering firms globally.

## Our Solutions



MODULAR TREATMENT SYSTEMS



ADEGE PACKAGED UNITS (APU)



WATERPOD CONTAINERIZED SYSTEMS



ULTRA-HIGH RECOVERY FLOW REVERSAL RO



biotta® BIOLOGICAL TREATMENT



LARGE MODULAR TREATMENT SYSTEMS

## Project Installations by Contaminant

Contaminant	Number of Installations
Arsenic	400 + systems
Iron & Manganese	350 + systems
Radionuclides	60 + systems
Color, Odor, TDS	30 + systems
Nitrate	10 + systems

# Management Profiles



The AdEdge Management Team is comprised of well-respected veterans of the water treatment industry. These managers have extensive experience in a wide range of disciplines including sales, marketing, engineering, business development, operations, and the life sciences.

## **Rich Cavagnaro, Chief Executive Officer**

Rich Cavagnaro founder of AdEdge Water Technologies, LLC. has over 30 years of international business experience in strategic marketing, business development, product development, and commercialization of new products and services in a broad spectrum of industries. In 2013, Rich was recognized by the Metro Atlanta Chamber of Commerce's Businessperson of the Year. He was the recipient of the 2018 Innovation Award by Partnership Gwinnett. Also, in 2018 Rich was elected to participate on the Georgia District Export Council.

## **Greg Gilles, Vice President and Chief Technology Officer**

Greg Gilles has over 30 years of treatment technology, industrial, regulatory, engineering, and management experience. Mr. Gilles has written many publications and received awards for his accomplishments in the removal of arsenic from drinking water. In 2001, Mr. Gilles was presented the prestigious R&D100 Award recognizing the top 100 innovations of 2001 and the Innovative Technology Award from the Water Environment Federation for the development of arsenic removal systems. Mr. Gilles received a M.S. in Environmental Science and Engineering in 1984 and a B.A. in Biology and Chemistry from Indiana University.

## **Paul Sansone-Chief Financial Officer-Subcontractor**

Paul Sansone is a CFO with over 20 years of broad-based financial executive experience. As a partner of TechCXO, Paul currently provides CFO and related services to early growth stage organizations. Most recently, Paul was the chief financial officer for the Boys and Girls Clubs of America, leading one of the most recognized non-profit organizations in the world. Sansone has a BS in accounting and a BS in economics from St. Francis University of Pennsylvania and an MBA from Duke University's Fuqua School of Business.

## **Cliff Nelson, Vice President of Engineering**

Cliff Nelson has over 30 years working experience in the water treatment industry, including wastewater, potable water, pure and ultrapure water technologies. Experience includes equipment design and manufacture, process design, sales support, and technical support. His experience includes extensive design and fabrication of reverse osmosis and membrane treatment systems, including process design, sales support, and technical support. Prior working experiences included equipment design engineering for in plant production processes, and machine tool and equipment design.

## **Tyler Butel, Vice President of Sales**

Early in his career, Tyler secured patents for the design of unique prosthetic devices and engineered specialized seatbelt restrain systems for emergency vehicles. He also designed a small water treatment kiosk system for use at well-heads in communities with no distribution systems in developing countries. This specific effort was the catalyst for Tyler's career in and passion for clean water, leveraging his creative problem solving, technical background, and people skills to help communities and organizations design and implement water treatment solutions. Tyler graduated from Oklahoma Christian University with a degree in Mechanical Engineering.

## **Ronit Erlitzki, Ph.D., Director of Business Development**

Ronit Erlitzki has more than 20 years of experience in biochemistry research, operations management, and business development. As a research scientist, she published articles in peer-reviewed journals before starting a career in CleanTech business development with an emphasis on water and water technologies, and focus on innovation, product development, and strategic marketing. Ronit has a Ph.D. in Medical Sciences from the Technion, Israel Institute of Technology. In 2017, Ronit was recognized by the Federal Laboratory Consortium (FLC) for her involvement in promoting, educating, and facilitating the technology transfer of NoMonia from the USEPA to AdEdge.

## **Saqib Karori, Director of Project Management**

Saqib Karori, P.E., has over 14 years of experience in the water treatment industry. Prior to AdEdge, Saqib worked as a project manager for Westland Resources and 4 Peaks Engineering Services. Mr. Karori has extensive experience in organics and inorganics treatment design, water quality analysis, and project engineering. Saqib has a Master's of Science in Environmental Engineering from the University of Houston.

## **Eric Nicol, Director of Operations**

Eric Nicol has 20 years in the water treatment industry with extensive experience in operations, purchasing, and project management. Prior to AdEdge, Eric worked at Sunshine Water Treatment in Michigan where we oversaw the residential water treatment product line and residential technical service division. Mr. Nicol held positions in project management and applications engineering at AdEdge prior to his current position as Director of Operations. Eric has worked in the commercial, industrial, and municipal markets.

# Corporate Capabilities



## Manufacturing

AdEdge's manufacturing capabilities encompass mechanical assembly and testing and a panel shop for full electrical assembly and testing.

- Design and fabrication of WaterPOD treatment systems
- Design and fabrication of treatment systems, controls, control panels
- Design and fabrication of pump skids, recycle backwash systems, chemical feed
- Assembly of piping for PVC and stainless steel systems
- Assembly of valves, vessels, piping, and instrumentation into skidded systems
- Assembly of PLC-driven and relay-driven electrical panels using UL listed components



## Engineering

AdEdge's engineering capabilities make use of sound, proven principles for the hydraulic, mechanical, and electrical design of our treatment systems.

- Process Engineering: PID, PFD
- Mechanical design using 3D modeling
- Steel frame design, piping design
- Electrical control and instrumentation design
- Ladder logic design
- HMI programming



## Quality Assurance and Quality Control

When AdEdge is awarded a project, a Project Manager is selected by the Director of Operations to handle the development of the project as we are committed to providing a quality product for our customers. A strict set of procedures is followed diligently to ensure our manufacturing process goes smoothly once given the release to fabrication. AdEdge's engineering QA/QC process involves several steps by key team members in ensuring the design approach is in line with the project requirements, and consequently that the finished product is in line with the design approach.

The steps include:

- Project Kickoff Meeting
- Submittals Preparation
- Submittal Review Meeting
- Manufacturing Kickoff Meeting
- Manufacturing
- Consistency Review
- Manufacturing Quality Control



# AdEdge Treatment Matrix



Process	Biological Filtration		Adsorption				O/F	C/F	HMO	Ion Exchange								RO/NF	Physical	Oxidation
	biotta	NoMonia	AD74	E33	AD140	GAC	AD26	ADGS+	ADGS+	AD88	AD92	ADBor	ADCr6	ADNO3	ADPx	ADSOF	ADTOC	FR-RO	Air-Strp. & Filtration	Ozonation
Ammonia																				
Arsenic																				
Boron																				
Chromium VI																				
TDS																				
Fluoride																				
Gross Alpha																				
Hardness																				
Iron																				
Lead																				
Manganese																				
Nitrates																				
Perchlorate																				
PFAS																				
Radium																				
Selenium																				
Sulfides/Odor																				
TSS																				
TOC																				
Turbidity																				
Uranium																				
VOCs																				

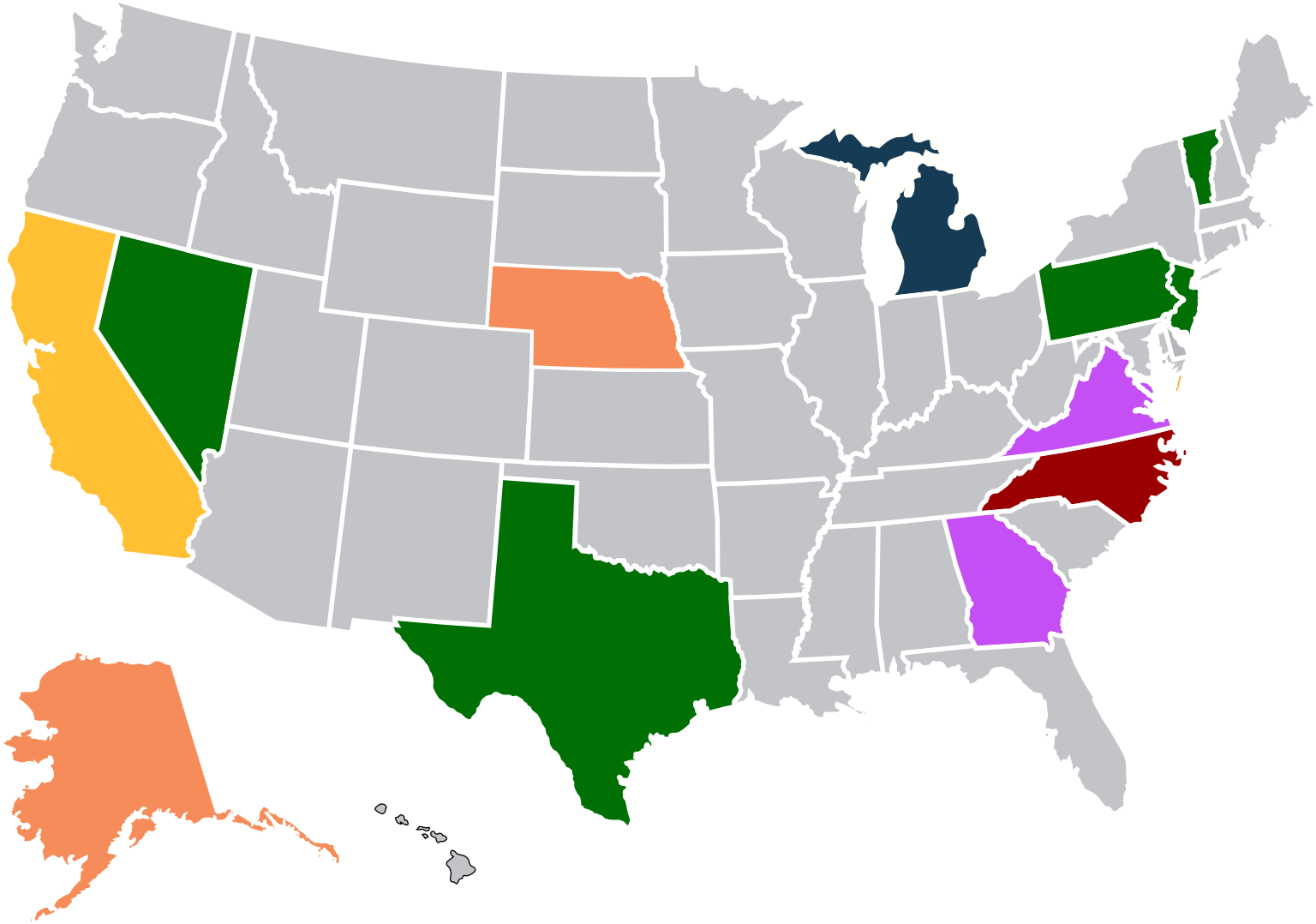
O/F-Oxidation / Filtration C/F-Coagulation /Filtration HMO-Hydrous Manganese Oxide RO-Reverse Osmosis NF-Nanofiltration

# Radionuclide Experience

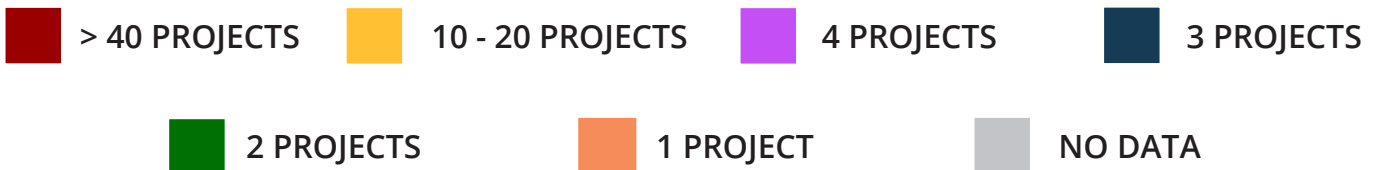


## OUR EXPERIENCE

Since our founding in 2002, AdEdge Water Technologies has successfully installed over dozens of radium, uranium, and gross alpha treatment solutions around the United States employing a both single-use ion exchanges and regenerable ion exchange. The map below depicts the number of arsenic treatment systems installed in each state in the United States.



## LEGEND



# Radionuclide Experience



AdEdge Water Technologies has successful installations for the removal of arsenic, iron, manganese, radionuclides, heavy metals, and nitrates using one of our proven treatment technologies. The following table lists those systems that have been installed for radionuclide removal:

Site/Location	State	Contaminant(s)	Flow Rate	Year
Alpine Water Users	California	Uranium	60 gpm	2015
Oak Street Well #14	New Jersey	Radium	300 gpm	2018
Broadhurst #2	North Carolina	Radium	90 gpm	2016
Henson Farms	North Carolina	Radium	30 gpm	2016
Camelot #1	North Carolina	Radium, Uranium	25 gpm	2017
Colony Village #23	North Carolina	Radium	90 gpm	2020
Hartman Farms	North Carolina	Gross Alpha, Radium	70 gpm	2016
Inwood Forest #6	North Carolina	Uranium	47 gpm	2016
Aqua NC - Mobile System	North Carolina	Radium	89 gpm	2017
River Oaks	North Carolina	Radium	35 gpm	2018
South Hills #2	North Carolina	Uranium	52 gpm	2020
Stoney Point	North Carolina	Radium	140 gpm	2015
Sunset Park #26	North Carolina	Radium	100 gpm	2020
Sunset Park #29	North Carolina	Radium	80 gpm	2020
Carlyle Manor #4	North Carolina	Iron, Manganese, Radium	38 gpm	2019
Shannon Woods	North Carolina	Iron, Manganese, Radium	50 gpm	2017
Emerald Gardens	North Carolina	Gross Alpha, Radium	100 gpm	2019
Quail's Nest #2	North Carolina	Radium	60 gpm	2018
Wesley Woods #1	North Carolina	Radium	44 gpm	2018
Foxbury	North Carolina	Radium	30 gpm	2020
Arrowbear Park #2	California	Uranium	200 gpm	2010
Arrowhead Villas Mutual Water	California	Uranium	45 gpm	2016
Azzie Manor	Virginia	Uranium	20 gpm	2020
Bois Forte Band, Nett Lake	Minnesota	Iron, Manganese, Radium	75 gpm	2020
Campo Indian Reservation	California	Uranium	50 gpm	2010
Chico	Texas	Uranium	275 gpm	2014
Cider Mill Crossing	Michigan	Iron, Manganese, Uranium	300 gpm	2013
City of Warm Springs	Georgia	Radium	200 gpm	2014
College Park - Brady Well	Georgia	Radium	125 gpm	2017
College Park - Victoria Well	Georgia	Manganese, Radium, Uranium	75 gpm	2017

# Radionuclide Experience



AdEdge Water Technologies has successful installations for the removal of arsenic, iron, manganese, radionuclides, heavy metals, and nitrates using one of our proven treatment technologies. The following table lists those systems that have been installed for radionuclide removal:

Site/Location	State	Contaminant(s)	Flow Rate	Year
Colony Village #33	North Carolina	Radium	85 gpm	2015
Camberly	North Carolina	Uranium	40 gpm	2017
Farmington #12	North Carolina	Radium	108 gpm	2015
Jones Dairy, Holland Downs	North Carolina	Radium	50 gpm	2015
June Lake	California	Uranium	80 gpm	2016
Ludlow Water	California	Arsenic, Uranium	50 gpm	2020
Moorefield	North Carolina	Radium	80 gpm	2014
Oakvale MHP	California	Iron, Manganese, Uranium	30 gpm	2015
Pine Ridge	Michigan	Radium	200 gpm	2018
Rancho Santa Teresa Municipal	California	Uranium	80 gpm	2018
Robinwood #67	North Carolina	Radium	75 gpm	2015
Rosemont Community Water	North Carolina	Uranium	120 gpm	2014
Scotland	Georgia	Radium	300 gpm	2018
Sun Leisure Estates	Arizona	Uranium	20 gpm	2018
Terranova Well, Fauquier County	Virginia	Radium	110 gpm	2018
Timberline Shores	North Carolina	Uranium	95 gpm	2014
Cliffdale West Farmington	North Carolina	Radium	108 gpm	2016
Township of Silver Springs	Pennsylvania	Radium	40 gpm	2011
Campbell Ranch	Nevada	Uranium	200 gpm	2012
Barona Resort and Casino	California	Uranium	250 gpm	2009
Elk Point Country Club	Nevada	Uranium	120 gpm	2010
Village of Clarks	Nebraska	Uranium	200 gpm	2011
Big Sandy Rancheria	California	Uranium	35 gpm	2011
Middletown Springs School	Vermont	Uranium	15 gpm	2010
Village of Marshfield	Vermont	Uranium	80 gpm	2008
Beaver Run	North Carolina	Radium	50 gpm	2015
Bridgeport	North Carolina	Radium	81 gpm	2016
Pine Ridge	Michigan	Radium	Pilot	2017
Cliffdale Middle Creek	North Carolina	Radium	52 gpm	2015
Spring Shores	North Carolina	Radium	40 gpm	2015

# Radionuclide Reference List



Site Information & Contact	Equipment Design Installation Year	Site Information & Contact	Equipment Design Installation Year
<b>Township of Silver Spring, NJ</b> Mr. Rory Chapman Alpha Consulting Engineers, Inc. 717-770-2500 rchapman@alphacei.com	Flow Rate: 40 gpm Radium Removal AD88 IX Media Start-up 2014	<b>Arrowbear Park County, CA</b> John Egan, P.E. Eng. Resources of California 909-890-1255 jegan@erscinc.com	Flow Rate: Uranium Removal AD92 IX Media Start-up 2011
<b>Town of Warm Springs, GA</b> Mr. Garland Long Lakeshore Engineering 404-355-3976 Glong09@bellsouth.net	Flow Rate: 200 gpm Radium Removal GS+ Media Start-up 2016	<b>Big Sandy Rancheria, CA</b> Mike Baty Big Sandy Rancheria 559-374-0066 ext. 224 mikebaty@bsrnat.com	Flow Rate: 35 gpm Uranium Removal AD92 IX Media Start-up 2011
<b>Oak Street Station, NJ</b> Ms. Lindsey Olsen American Water 609-226-0020 Lindsey.olsen@amwater.com	Flow Rate: 300 gpm Radium Removal AD88 IX Media Start-up 2018	<b>Timberline Shores, NC</b> Chris Weaver AQUA North Carolina 919-653-6965 clweaver@aquaamerica.com	Flow Rate: 300 gpm Uranium Removal AD92 IX Media Start-up 2014
<b>Emerald Gardens, NC</b> Mr. Michael Moulton, P.E. Aqua North Carolina (704) 489-9404 ext. 57238 mmelton@aquaamerica.com	Flow Rate: 18 gpm Radium Removal AD88 IX Media Start-up 2020	<b>Chico, Texas</b> David Perkins, P.E. KSA Engineers, Inc. 972-542-2995 dperkins@ksaeng.com	Flow Rate: 275 gpm Uranium Removal AD92 IX Media Start-up 2015
<b>Scotland, GA</b> Mr. Kirk Lewis City of Scotland 478-278-3554	Flow Rate: 300 gpm Radium Removal GS+ Media Start-up 2018	<b>Barona Resort &amp; Casino, CA</b> James Matthews PACE Engineers 714-481-7221 jmatthews@pacewater.com	Flow Rate: 240 gpm Uranium Removal AD92 IX Media Start-up 2009
<b>Pine Ridge, MI</b> Mr. Hugh Kennedy Boss Engineering 517- 546-4836 hughk@bosseng.com	Flow Rate: 200 gpm Radium Removal GS+ Media Start-up 2018	<b>June Lake, CA</b> Yesenia Jepsen June Lake Public Works 760-648-7778	Flow Rate: 80 gpm Uranium Removal AD92 IX Media Start-up 2016

# EPA Project List



AdEdge Water Technologies, LLC. was selected by USEPA through an expert peer review process in cooperation with the individual host sites to conduct full scale arsenic treatment demonstrations using its Granular Ferric Oxide adsorption and AD26 oxidation/filtration technologies. The program gathers extensive cost and performance data on commercially available, proven technologies which are candidates to become Best Available Technology (BAT) for arsenic removal. AdEdge was awarded the following 12 projects treating individual or multiple wells ranging from 20 to 300 gpm.

Site/Location	Media	Flow Rate
Rimrock, Arizona	E33	40 gpm
Rollinsford, New Hampshire	E33	160 gpm
Nambe Pueblo, New Mexico	E33	160 gpm
Goffstown, New Hampshire	E33	20 gpm
Springfield, Ohio	AD26/E33	250 gpm
Stewart, Minnesota	E33	300 gpm
Bruni, Texas	E33	50 gpm
Wellman, Texas	E33	100 gpm
Sells, Arizona	E33	100 gpm
Geneseo Hills, Illinois	AD26/E33	200 gpm
Clinton Christian School, Indiana	AD26/E33	25 gpm
Conneaut Lake Park, Pennsylvania	AD26	250 gpm

# Large Pressure Vessel Experience List



AdEdge Water Technologies has successful installations using pressure vessels with an eight-foot diameter or larger. The list below details these projects.

Project Name	Location	Vessel Information	Process	Flow Rate	Year
Lower Greasewood	AZ	(2) 11' - 0" Dia	GAC	700 gpm	In Fabrication
Shea Homes	CA	(2) 8' - 0" Dia	E33	700 gpm	In Fabrication
Lemoore	CA	(18) 12' - 0" Dia (18) 10' - 0" Dia	GAC, IX	10,500 gpm	2020*
CHS Refinery	MT	(2) 10' - 0" Dia x 30' - 0" Horizontal	C/F	2,400 gpm	2020*
Alpaugh	CA	(2) 9' - 0" Dia	E33	600 gpm	2020*
Bernalillo	NM	(4) 8' - 0" Dia	O/F	850 gpm	2020*
Crystal Geysers	CA	(2) 8' - 0" Dia	E33	350 gpm	2020*
Hanford	CA	(2) 11' - 0" Dia	E33	1,300 gpm	2020
Taylorville	IL	(4) 8' - 0" Dia	biotta®	1,050 gpm	2019
Jerritt Canyon	NV	(10) 8' - 0" Dia	C/F, E33	1,400 gpm	2019
White Rock	BC	(2) 10' - 0" Dia x 18' - 0" Horizontal (4) 10' - 0" Dia	O/F, E33	2,751 gpm	2018
AySA Ezeiza	Argentina	(6) 12' - 0" Dia	E33	2,640 gpm	2018
Mount Joy	PA	(3) 8' - 0" Dia	IX	700 gpm	2018
New Windsor	NY	(10) 10' - 0" Dia	O/F	4,500 gpm	2018
Bakersfield	CA	(2) 8' - 0" Dia	E33	1,000 gpm	2017
San Antonio	Chile	(9) 10' - 6" Dia x 15' - 9" Horizontal	C/F, E33	7,925 gpm	2017
West Valley	CA	(1) 12' - 0" Dia	biotta®	550 gpm	2017
South San Francisco	CA	(1) 7' - 0" Dia x 17' - 4" Horizontal	O/F	1,950 gpm	2017
Delano	CA	(2) 8' - 0" Dia	biotta®	350 gpm	2016

\* Start-up Ongoing or Pending

## Key

- biotta® = Patented two-stage biological treatment process for nitrate removal
- C/F: Coagulation/Filtration with AdEdge Catalytic Media
- E33: Adsorption with Bayoxide® E33 GFO Media
- GAC: Granular Activated Carbon
- IX: Ion Exchange
- O/F: Oxidation/Filtration with AdEdge Catalytic Media



## AdEdge Technologies Reference Response

Multiple Districts in California are working with AdEdge Technologies and utilizing similar systems for gross alpha removal. The District reached out to a group of these Districts, and asked a series of questions relating to the systems and working with AdEdge. The agencies we contacted were as follows:

- |                                  |         |            |
|----------------------------------|---------|------------|
| - Alpine Water Users Association | 60 GPM  | 2015       |
| - Arrowbear Park Water           | 200 GPM | 2010       |
| - June Lake PUD                  | 80 GPM  | 2016, 2020 |
| - Arrowhead Villas Mutual Water  | 45 GPM  | 2016       |

This list comprised the Districts in California of a similar geographical makeup, utilizing AdEdge specifically for Uranium removal, and using the IX system. Of those contacted, only two agencies responded to our questions. These were **Alpine Water** and **June Lake**, and their responses are listed below, color-coded accordingly.

### **“Is the system still in operation?”**

- **Alpine Water is currently using AdEdge at our Well 1 and 11 sites. Well 1 is a 12-vessel IX plant and Well 11 is a 2-vessel IX plant.**
- **Yes.**

### **“Would you work with AdEdge again if you needed specialty removal?”**

- **This is tricky... Alpine had a heck of a time trying to get our 2 retired vessels disposed at Well 11. AdEdge is based out of Georgia where they don't have major issues with disposing retired vessels. Trying to get AdEdge to work with California's stricter laws was an issue. AdEdge tried hard with finding someone to dispose of the retired vessels but ended up putting the ball in my court because nothing was getting done. This was frustrating. I ended up finding someone to dispose of the vessels locally. AdEdge needs a turnkey process, but I'm not sure if this has been resolved.**
- **The PUD has been working with AdEdge on various projects.**



**“What are your major complaints, if any, about the system?”**

- Only major complaints are listed above. (Vessel disposal)
- There are no major complaints on the system, but I would have a meter after the vessel to get the total gallons coming from the vessel.

**“Did you find there were any hidden costs you wish had been better communicated?”**

- Not to my knowledge. Better communication could have been the disposal cost.
- There were no hidden costs.

**“Did the system meet your removal needs and provide the GPM output you planned for?”**

- Yes.
- The system removal meets our needs. The PUD set the flows to the specs of the membrane treatment system.

Agencies were asked for any other comments, and none were provided.

Other agencies were considered, but factors such as being located in other states, similar but not the same type of removal and geographical limitations were dissimilar enough to be considered less accurate for our needs.

## CVWD - Electra Well ROI Calculator

Cost Of Well / AcFt	\$390.00
Minutes Per Day	<b>1440</b>
GPM	<b>30</b>
AcFt/Yr	48.391992
Cost/Yr	\$18,872.88

Cost of CLAWA / AcFt	\$1,254.00
Minutes Per Day	1440
GPM	30
AcFt/Yr	48.391992
Cost/Yr	\$60,683.56

Maintenance Per Year	\$20,000.00
Savings Per Year	\$21,810.68

Total Cost Of Well/Yr	\$38,872.88
Total Construction Costs	\$222,000.00

<b>Cost Recovery Years</b>	<b>11.96078544</b>
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## Electra Well Cost Analysis

In order to properly estimate the amount of time it will take Crestline Village Water District to recapture the initial and ongoing costs of adding the Electra well to the system, the District utilized the information provided in the annual audit performed by Rogers, Anderson, Malody and Scott (RAMS).

Data provided included the acre-feet of water both produced and purchased for the 2020 year, as well as the cost to produce versus the cost of purchasing. Utilizing the numbers provided, we can see the immediate and long-term benefit to the District by adding the Electra well as a production source.

<b>Annual Usage</b>		<b>Actual Usage, 2020</b>			
<b>Source</b>	<b>Amount (AcFt)</b>	<b>Cost/AcFt</b>	<b>Extended</b>	<b>% of Ttl</b>	
Produced (Wells)	506.48	\$390	\$197,527.20	74.50%	
Purchased (CLAWA)	173.45	\$1,178	\$204,324.10	25.50%	
<b><u>Adjusted for Electra</u></b>		<b><u>Simulated, Assumed 40 AcFt/Yr</u></b>			
<b>Source</b>	<b>Amount (AcFt)</b>	<b>Cost/AcFt</b>	<b>Extended</b>	<b>% of Ttl</b>	
Produced	546.48	\$390	\$213,127.20	80.40%	
Purchased	133.45	\$1,178	\$157,204.10	19.60%	

### Known Values:

- The Electra well can produce significantly more than 30gpm, and for extended periods. This was verified in flushing and testing the well on startup. 30gpm kept the costs for Uranium removal under a cap, saving a higher initial cost as well as higher disposal costs.
- Gross Alpha levels can not be assumed, nor can it be assumed that they may decrease over time.
- The simulated usage assumes 20/7/365 operation at the target of 30gpm.
- CLAWA costs have increased since the audit, and will likely continue. (Currently \$1,254/AcFt)