

ALPHA WATER



TECHNOLOGIES, LLC



**Technology Designed By Nature To  
Revolutionize Water Treatment Worldwide**

ALPHA WATER



TECHNOLOGIES, LLC

The revolutionary AWT system uses an Advanced Vortex Reactor to desalinate, remove contaminants, separate solids and destroy all biological contaminants. This approach is at least ten times more energy efficient and ten times lower cost than RO desalination. Reliability is unmatched since minimal filters are used in the preliminary system. The 500,000 GPD System uses only 1200 kWh per 24-hour period



ALPHA WATER



TECHNOLOGIES, LLC

While conventional desalination produces 50% - 60% waste discharge, the AWT system produces less than 3%, which can then be separated and utilized for various commercial products such as specific elements, fertilizers and building materials. This means that in addition to providing a cost effective global desalination solution, the AWT system can also retrofit existing desalination, municipal and sewage treatment facilities, effectively removing the inherent pollution of conventional water treatment, regardless of process.

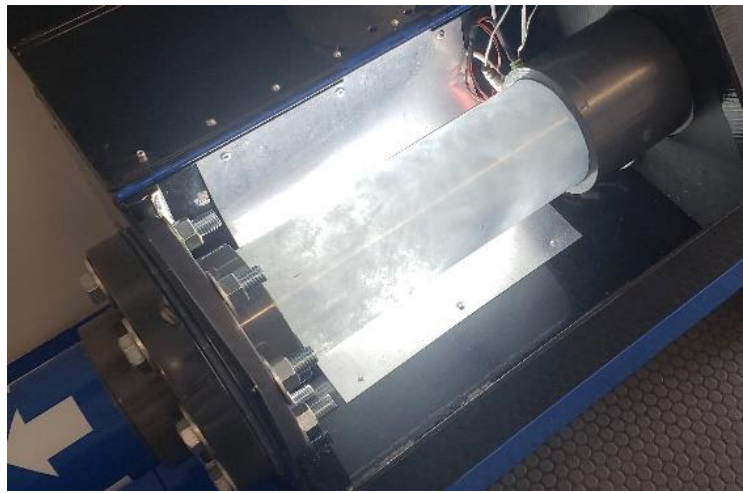


“Over the last 20 years, the Western Municipal Water District in CA has tested numerous treatment technologies exploring ways to reduce cost and improve water quality. The AWT Reactor which was tested at the Arlington De-salter facility **is extraordinary** both in its efficacy and performance.”

Ray Marshall, Chief Plant Operator

- 
1. Introduction
  2. Overview of Hydrodynamic Cavitation
  3. Past Trials and Proven Results
  4. Q & A, Use Case Collaborative Discussion
  5. Suggested Next Steps For Engagement





# • Alpha Water Technologies, LLC

- Founded in 2014
- Headquartered in Newport Beach, California
- All products are proudly designed and manufactured in the USA
- Revolutionizes desalination and water treatment
- Several International patents pending





# Overview of Hydrodynamic Cavitation

---

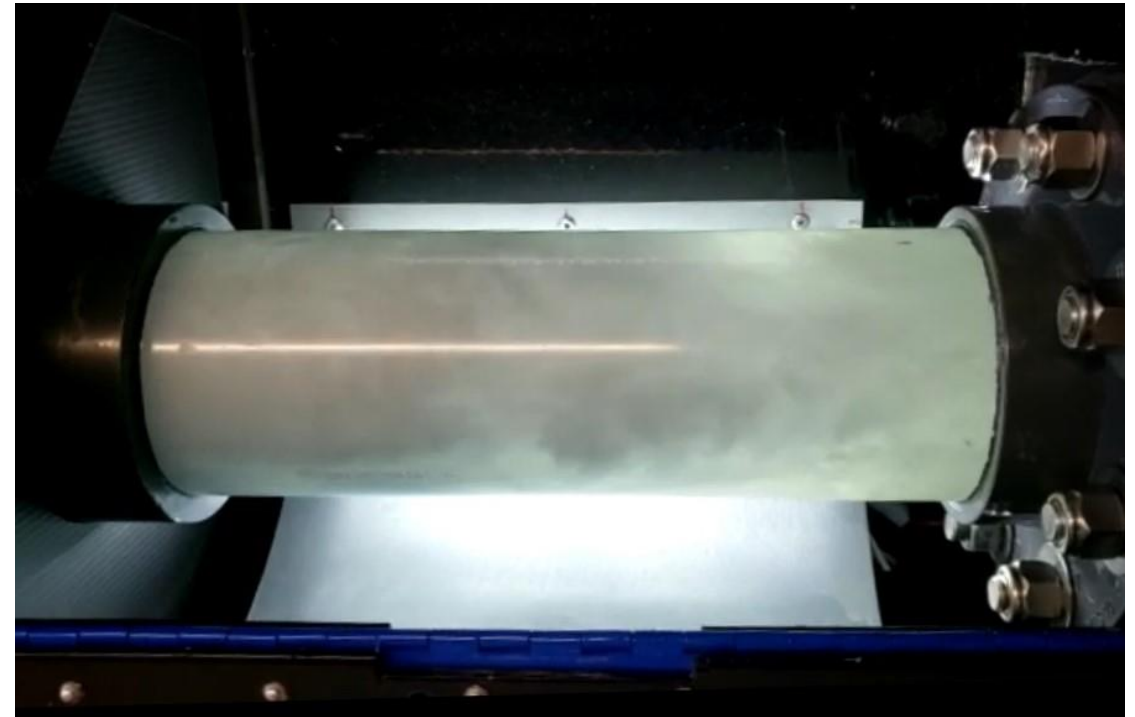
Cavitation involves the formation and collapse of vapor cavities in a liquid. The collapse or implosion of these cavities creates localized zones of high temperature and pressure. Hydrodynamic cavitation occurs when liquid flow conditions create pressure variations. In aqueous streams, hydrodynamic cavitation results in formation of hydroxyl radicals, as well as transformations to dissolved salts and suspended minerals.

## Physical Processes

- Pathogen cell disruption
- Mineral and salt transformations
- Emulsification
- Atomization
- Generation of nano particles

## Chemical Processes

- Increased transport coefficients
- Increased interfacial area
- Oxidation
- Crystallization
- Generation of extreme temperature and pressure



# AWT Reaction Process



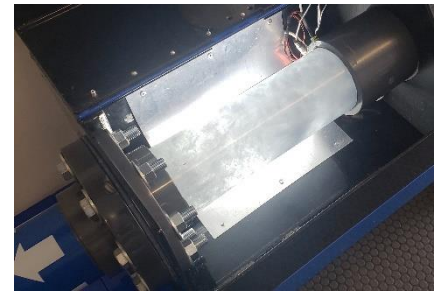
## Intake

Water is pumped into the Unit at high pressure. Multiple units can be used in parallel to meet flow rate requirements.



## Reactor Zone

Within the Reactor, the process stream undergoes HDC, changing the structural and charge characteristics of the particulates and removes organic and inorganic contaminants



## Final Processing

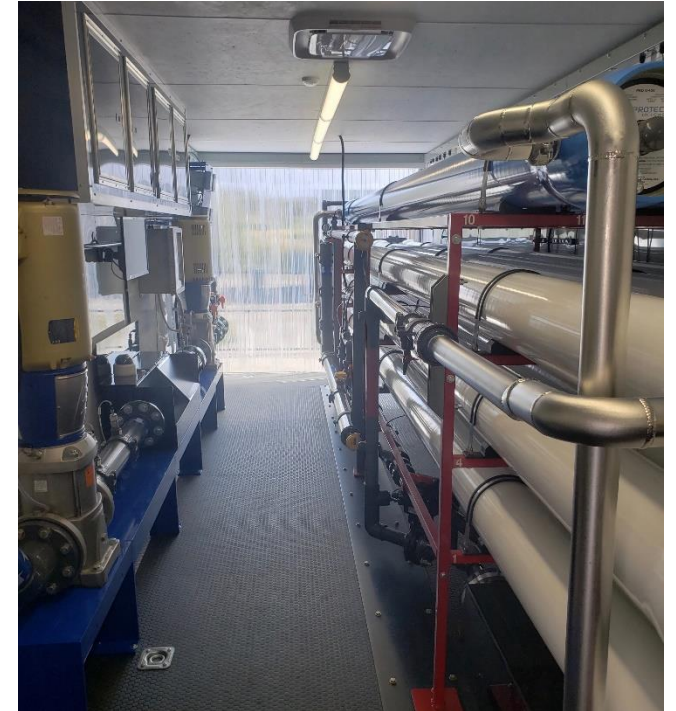
Depending on the application, the water stream can also be used in tandem with filtration separation and reverse osmosis. A secondary hydrodynamic cavitation process can be applied to achieve zero water discharge.



# Process Advantages

---

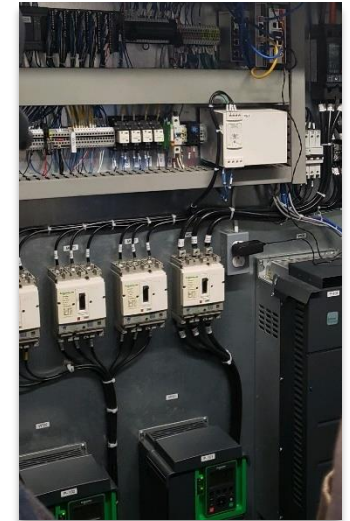
- Simple, robust technology
  - Durable, wear-resistant components
  - No moving parts
  - Off-the-shelf auxiliaries: Pumps, valves, etc.
- Small footprint
  - Each 14" x 14" x 48" reactor processes 500k gallons of water per day
  - Multiple units can be manifolded together for economies of scale
  - Solution can be containerized or deployed in a fixed, in building configuration
- Economic Advantages
  - Low life cycle cost - No reagents or consumables
  - Extend lifecycle for RO filters by a minimum of 40% resulting in significant cost savings
  - Recovered water from RO discharge can be placed back into supply vs discharged
  - Recovered Phosphorus/Nitrates can be recycled vs discharged, preventing algal blooms at the source
  - Separation of Precious Metals – generates revenue
- Fully automated and extremely energy efficient
- Less than 22 amps per gallon to process



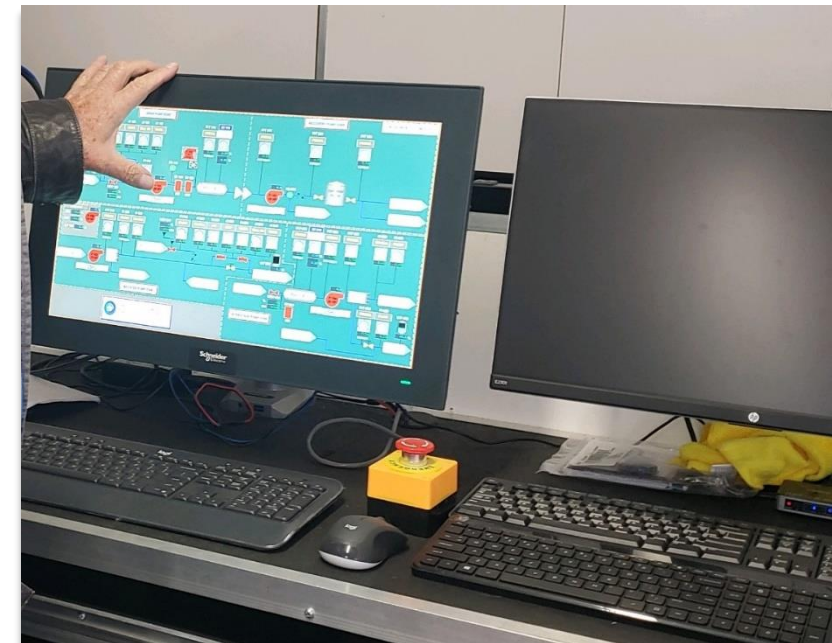
# Real-Time Efficient Operations

## Technical Concept of Operations (CONOPS)

- The AWT system is designed for manned, remotely monitored, and/or autonomous operations
- At the heart of the purification flow is the monitoring and control system that manages the subsystems
- Pre-set, optimized system settings (flow rate, pressure, valves, injections, etc.) are centrally initiated and operated according to the inflow water qualities and desired outflow purity ***based on local conditions***



<b><i>Desired Outflow Inflow Quality</i></b>	<b>Remediation</b>	<b>Removal</b>	<b>Purification</b>
Heavy Metals	Control Settings 1	Control Settings 2	Control Settings 3
Hardness	Control Settings 4	Control Settings 5	Control Settings 6
Chemicals	Control Settings 7	Control Settings 8	Control Settings 9
Biologics	Control Settings 10	Control Settings 11	Control Settings 12
Combinations	Control Settings 13	Control Settings 14	Control Settings 15



# Trial 1 – Heavy Metal Mine Discharge (Sept. 2015)

---

## Site Description

- Carpenter Snow Creek Mining District Superfund Site (CSCMD), Cascade County, Montana
- 9,000 acres with mine tailings, waste rock, and acid mine drainage
- 90 abandoned mines resulting in metal concentrations in surface water and soil at levels that are detrimental to human health and environment
- Added to Superfund Program's National Priorities List in 2001

## Proposed Objectives

- Reduce heavy metal concentrations
- Demonstrate cost effectiveness
- Demonstrate small footprint, rapid deployment, and low-maintenance operation
- Mine discharge water was processed with the AWT system under several scenarios

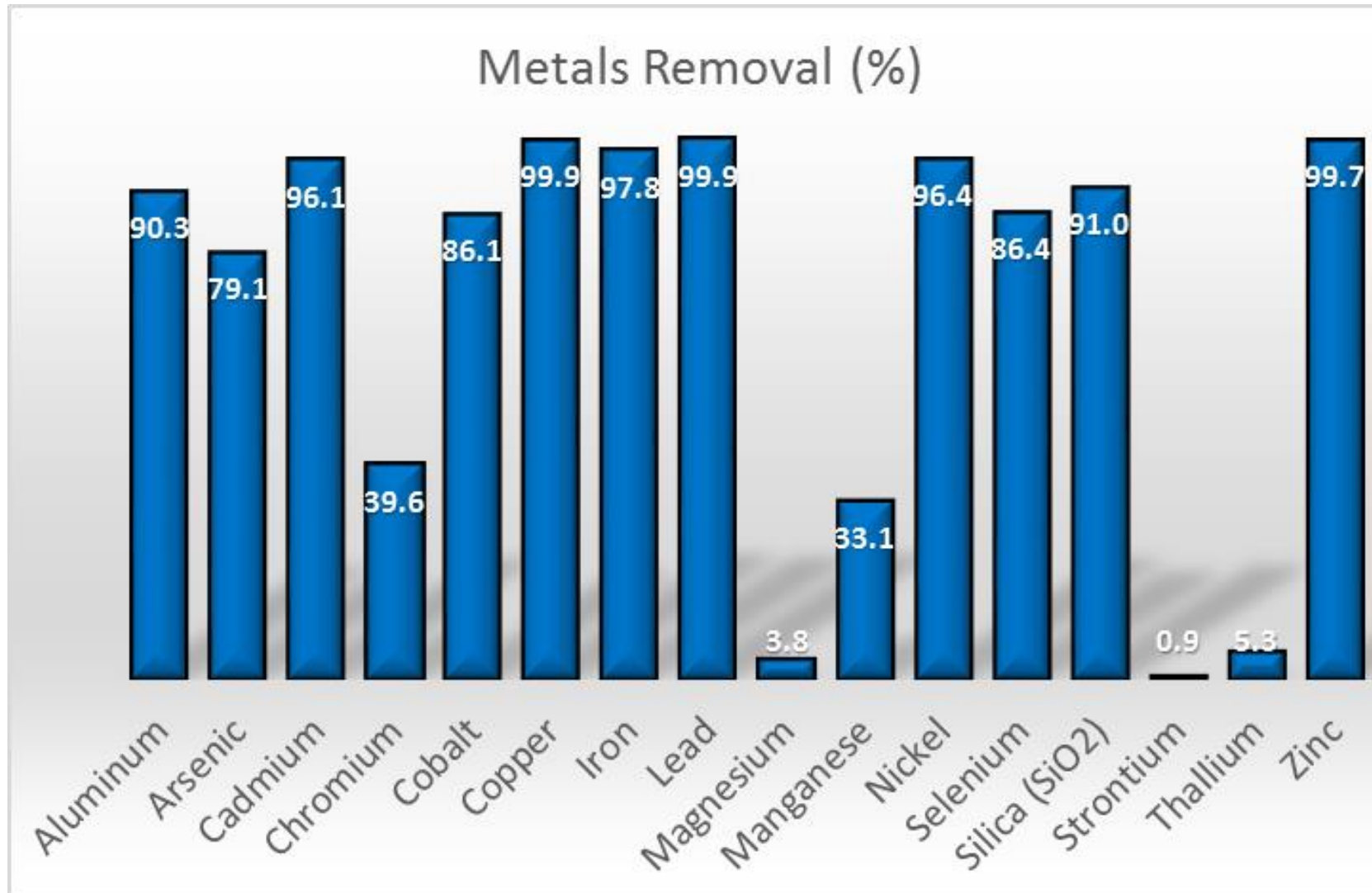
***“We selected the toughest challenges facing CSCMD in 2015 for the reactor tests. Results were exceptional”***

Environmental Protection Agency Project Manager



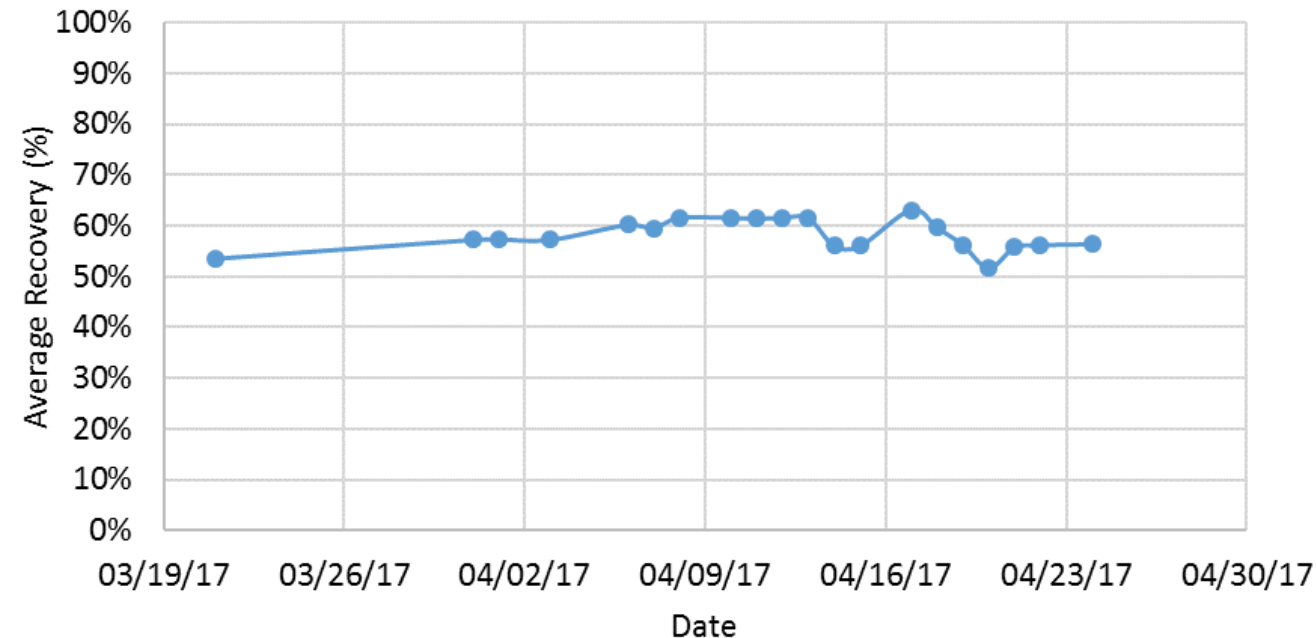
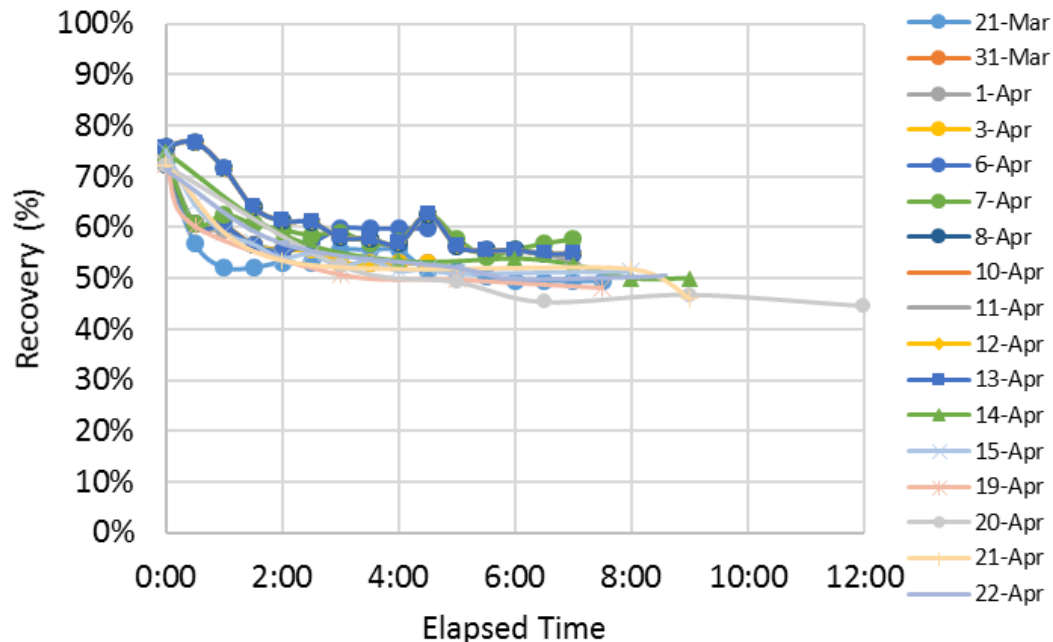


## Trial 1 Results – Heavy Metal Removal (Blind Test)

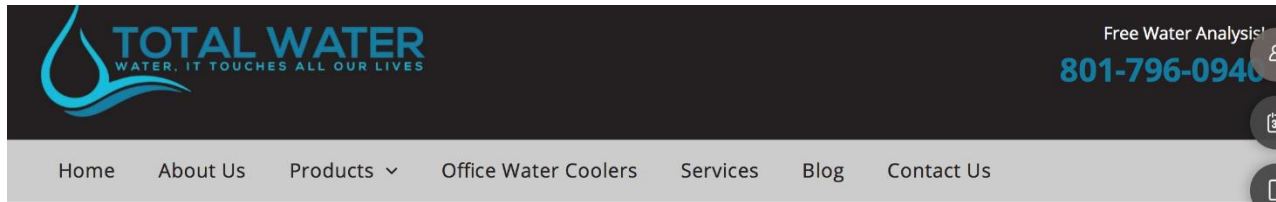


# Trial 2 - Reverse Osmosis (RO) Discharge Recovery - Riverside, CA 09-07-17

- Arlington Desalter processes 7 MG per day of brackish well water into drinking water
- Processed a stream of reverse osmosis concentrate through HydroVelocity Reactor and then back through RO
- Recovering 50-60% of RO concentrate without fouling membranes



# AWT Trial 3 – Potable Water Production - Riverton, Utah

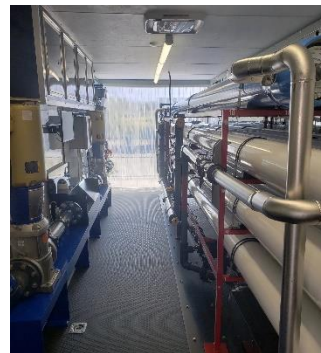


## Riverton Switching Water Source, and the Need for Softeners and Reverse Osmosis

By Daryl Angelo ESTRELLA • 23 May, 2018 • 0 Comments

Riverton, Utah's water has notoriously been one of the worst water supplies on the Wasatch front. The water hardness typically tests between 30 GPG (grains per gallon) to 60 GPG. Pretty much liquid rock. Because of the effect this water has had on home plumbing, appliances, clothes, fixtures, and the like, the city council voted to switch their water source to the Jordan Valley Conservancy District. The change will go into effect May 1, 2015.

All in all this is a great move for the residents of Riverton. The new water source will not be as damaging and costly as Riverton's because the TDS (Total Dissolved Solids) and the hardness levels are much lower. It will also not be as taxing on the water treatment equipment already in the home, such as water softeners, and reverse osmosis units.



- The six primary deep water wells servicing Riverton, Utah's population of 45,000 and growing have been closed since May 1, 2015 due to water hardness and its adverse impact on both production and consumer infrastructure
- AWT mobilized its self-contained unit on October 2019 to demonstrate ability to reuse water supply and treat to drinking water standards



# Production Table

# of Reactors	GPH <sup>1</sup> Output	BPH <sup>2</sup> Output	LPH <sup>3</sup> Output	GPD <sup>4</sup> Output	BPD <sup>5</sup> Output	LPD <sup>6</sup> Output	GPY <sup>7</sup> Output	BPY <sup>8</sup> Output	LPY <sup>9</sup> Output
1	16,800	400	63,588	403,200	9,600	1,526,112	147,168,000	350,4000	557,030,880
2	33,600	800	127,176	806,400	19,200	3,052,224	294,336,000	700,8000	1,114,061,760
3	50,400	1,200	190,764	1,209,600	28,800	4,578,336	441,504,000	10,512,000	1,671,092,640
4	67,200	1,600	254,352	1,612,800	38,400	6,104,448	588,672,000	14,016,000	2,228,123,520
10	168,000	4,000	635,880	4,032,000	96,000	15,261,120	1,471,680,000	35,040,000	5,570,308,800
25	420,000	10,000	1,589,700	10,080,000	240,000	38,152,800	3,679,200,000	87,600,000	13,925,772,000
100	1,680,000	40,000	6,358,800	40,320,000	960,000	152,611,200	14,716,800,000	350,400,000	55,703,088,000

<sup>1</sup> Gallons Per Hour

<sup>2</sup> Barrels Per Hour

<sup>3</sup> Liters Per Hour

<sup>4</sup> Gallons Per Day

<sup>5</sup> Barrels Per Day

<sup>6</sup> Liters Per Day

<sup>7</sup> Gallons Per Year

<sup>8</sup> Barrels Per Year

<sup>9</sup> Liters Per Year

# Strategic Partnerships

---

- Technology can be integrated with existing treatment processes for operational and financial savings
- AWT strategically aligns with certified service delivery partners providing “one-stop” for implementation, support, and complementary technology integration as required
- AWT Strategic Partners include US Based market leaders:



# Primary Applications

Application	Benefits
Potable Water Production From Compromised Water Sources (Fixed or Containerized)	<ul style="list-style-type: none"> <li>• Removal of Biological Contaminants, Total Dissolved Solids, Heavy Metals, and Chlorides exceeding EPA standards</li> <li>• Maximize water reclamation from RO discharge to 95%</li> <li>• Recycle inert byproducts for recycle/additional revenue streams (Phosphates, Nitrates, Calcium, Magnesium – and much more)</li> </ul>
Reverse Osmosis Optimization – Existing Plant Operations -- Desalination	<ul style="list-style-type: none"> <li>• Brine Discharge Reclamation of 95%</li> <li>• Minimize maintenance of existing RO systems through hydrodynamic cavitation pre-treatment and secondary treatment</li> </ul>
Algal Bloom Prevention and Remediation	<ul style="list-style-type: none"> <li>• Algal Blooms can be destroyed without impact to environment and without chemicals</li> <li>• Phosphorus and nitrates can be removed and then recycled in high concentrations for agricultural reuse and additional revenue streams</li> </ul>
Wastewater Treatment And Discharge Reclamation	<ul style="list-style-type: none"> <li>• Primary treatment / secondary treatment of waste discharge for agricultural reuse</li> </ul>



# Alpha Water Technologies

---



Michael Smith

Contact

[michaeltg1@protonmail.com](mailto:michaeltg1@protonmail.com)

714 262 6839