



MEMORANDUM

Date: November 28, 2016

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

A handwritten signature in black ink, appearing to read "CHH", is written over the printed name "C.H. Huckelberry".

Re: **Water Research Advancement at the Water & Energy, Sustainable Technology (WEST) Center**

As you know, Pima County, in cooperation with The University of Arizona, has established the WEST Campus located in the vicinity of our Tres Ríos and Agua Nueva Wastewater Reclamation Facilities. The purpose of WEST is to advance technology and research in the area of water. The attached memorandum from the Regional Wastewater Reclamation Director identifies a number of technological advances and operational modifications that will financially benefit the wastewater utility and potentially all other wastewater utilities; not only in Arizona, but across the country.

The County is a leader, along with The University of Arizona, in water-related research. Some of the highlights of these activities occurring at WEST include:

- Development of a new treatment process targeting prevention of the formation of disinfection byproducts known as trihalomethanes, or THMs, which are known cancer-causing contaminants.
- The County won the Water Innovation Challenge Grant with an estimated value of \$302,500. The primary purpose of this grant is to improve public education and attitude regarding potable water reuse or treated effluent as a water source.
- Developed a pilot project for the use of waste CO₂ for controlling struvite formation at the Tres Ríos facility. Not only will the pilot result in reduced carbon dioxide emissions, it will also reduce and/or illuminate struvite formation, which has been problematic from a maintenance cost perspective.
- In future projects, a new system for the sequestration of phosphorus is proposed. Phosphorus is a wastewater treatment remnant that will likely be highly regulated in the future regarding discharge standards. Hence, it is appropriate to eliminate from the effluent stream, as well as to eliminate the formation of struvite.

The Honorable Chair and Members, Pima County Board of Supervisors
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- Pilot a new treatment system that reduces the electric energy consumption associated with aeration required for nutrient removal by introducing an anaerobic process for ammonia oxidation and removal.

Clearly, WEST, in its first year of operation, has provided significant technological benefits and improvements not only to Pima County, but also the state and nation in advancing water treatment and use concepts.

CHH/anc

Attachment

c: John Bernal, Deputy County Administrator for Public Works
Jackson Jenkins, Director, Regional Wastewater Reclamation Department



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November 18, 2016

TO: C.H. Huckelberry, County Administrator
THRU: John M. Bernal, P.E., Deputy County Administrator – Public Works
FROM: Jackson Jenkins, Director – RWRD
SUBJECT: **Innovations in Wastewater**

This month marks the one year anniversary of the Water & Energy, Sustainable Technology (WEST) Center dedication and the creation of the Water Campus. As initially envisioned, the creation of this world class facility continues to generate rewards benefitting not only the citizens of Pima County, but also impacting the water industry as a whole. Our approach for partnering public and private water professionals in research and development has been greeted with overwhelming support and is achieving a holistic approach towards water utility stewardship.

This is best exemplified through our participation in the Water & Energy Research Foundation's Leaders Innovation Forum for Technology (LIFT) program. The LIFT program provides RWRD an excellent opportunity to participate and lead research efforts targeted at improving operational efficiencies at our treatment facilities while reducing operational costs for ratepayers.

Our extensive group of talented staff provides comprehensive knowledge and backgrounds in a variety of areas and RWRD routinely puts those talents to use in the development of innovative, in-house solutions for solving problems. The economic downturn experienced in recent years continues to force utilities to look for innovate ways to reduce or maintain the costs without significant increases. The following timeline demonstrates just a few projects that RWRD is working on to meet these demands and the rapid momentum underway.

April

The Water Environment Research Foundation (WERF) and LIFT Steering Committee created the National Water Resource Recovery Test Bed Facility Network and Directory connecting researchers, new technology providers, and other innovators in the water resources recovery industry with test facilities. Our Water Campus in one of nine, level-four facilities in North America making Pima County an ideal destination for manufacturers and researchers to evaluate new technologies in real world applications. At no cost to our rate payers, this program provides an opportunity to test equipment and technologies first hand prior to purchases and implementation and thereby benefitting our industry as a whole.

June

RWRD attended a LIFT working group session in Denver, Colorado and toured innovative side-stream ammonia treatment process and a struvite sequestration process pilots underway. Both of these processes are well suited for use at our Tres Rios WRF.

September

RWRD receives an inaugural Utility of the Future Today award. This award recognizes water utilities engaged in advancing resource recovery, energy efficiency, stakeholder relationships, and establishing resilient, sustainable, and livable communities. The recognition is presented by EPA, Water Reuse, NACWA, WERF and WEF. It is impressive to note that RWRD was recognized for a multitude of achievements encompassing nine different areas including resource recovery, water reuse, biosolids utilization, energy efficiency, stakeholder involvement and organizational culture.

October

RWRD dedicates a new treatment process targeted at preventing the formation of the disinfection by-products known as trihalomethanes, or THMs. After completion of the Tres Rios expansion, we observed that THM concentrations were increased substantially, a common phenomenon observed in nutrient removal facilities utilizing chlorination for disinfection. The engineered remedy for this problem was estimated at \$5M, but staff rallied around our chemical and operational knowledge and devised a rather clever solution that incorporates centrate, a waste product, for solving the problem. This was an in-house project entirely conceived and validated at the Water Campus and pilot tested for over a year at the Tres Rios WRF. The final solution was designed and constructed for under \$1M, and the results have been presented at multiple conferences. In fact, RWRD was solicited for consultation with the City of Phoenix to help address their THM abatement problems thereby benefitting fellow Arizonans.

Not only has this project saved \$4M in capital construction, it is slated to reduce operational costs through a reduction in hypochlorite and bisulfite chemical usage.

November

The Southwest Water Campus team lead by RWRD wins the statewide competition known as the Water Innovation Challenge with a total award value of \$302,500. The team members include water professionals throughout Arizona and their innovative solution involves the creation of a mobile treatment facility that will travel the state engaging citizens about potable reuse. The solution incorporates multiple cities and their local brewers to help with public perception associated with potable reuse.

This mobile treatment facility will be constructed at the Water Campus and will serve as a framework for helping ADEQ draft rules for the adoption of potable reuse in our state. Potable reuse could one day play a significant role in addressing Arizona water shortages while keeping water decisions local and without interferences from other states. While RWRD leads this project, team member agencies include Tucson Water, Marana Water, the University of Arizona, CH2M, Carollo Engineers and Water Reuse.

December

RWRD will begin operation of a Water & Environment Research Foundation (WERF) funded pilot project to evaluate the use of waste CO₂ for controlling struvite formation at Tres Rios. Struvite is a precipitate that commonly forms in biological nutrient removal processes and can often require extensive maintenance efforts and chemical addition to prevent struvite formation. At Tres Rios, we estimate struvite associated remediation efforts at \$400,000 annually.

This pilot project will target waste CO₂ to lower pH of the centrate side stream thereby minimizing struvite formation. Not only will this project provide an opportunity to perform real world solutions in an

industrial setting, a unique feature is that the team tasked with the design, construction and operation of the pilot are all female engineering students from the University of Arizona.

January

RWRD is scheduled to pilot a novel system for the sequestration of phosphorus and thereby eliminating struvite formation at our Tres Rios WRF. This four week pilot will help establish performance criteria for the removal of struvite at Tres Rios before it can precipitate and clog pipes. It is estimated that this process could save RWRD \$500,000 annually in both struvite mitigation efforts and reductions in both polymer and chemical additions. Mainstream technologies for treating struvite require a significantly higher capital investment and RWRD chose to pilot this newer technology after carefully considering alternative options and discussions with other LIFT members.

February

RWRD will begin bench scale piloting an innovative process for treating side stream ammonia flows for improved performance and reducing energy costs. Electricity is the single greatest operational costs for our utility with aeration associated with nutrient removal being the largest portion. Anaerobic ammonia oxidation, or anammox, is a relatively new concept that drastically reduces aeration costs up to 30%. This equates to approximately \$400,000 in energy savings annually at the Tres Rios WRF. RWRD and faculty from the University of Arizona's College of Engineering have recently submitted for a \$350,000 grant to demonstrate this process via a large scale pilot.

Based on early indicators of success, RWRD is moving forward with the construction of a bench-scaled demonstration at the WEST Center. The pilot will serve to optimize and target ideal operational control strategies prior to the full scale implementation. Because the anammox biology is very slow to replicate, it will take approximately four to six months to cultivate the necessary biological mass for full scale operation. RWRD and university faculty are therefore in the process of creating a farm to cultivate the anammox biology to facilitate full scale implementation possibly in FY2017/18.

I hope you are equally impressed as I am by the multiple collaborative efforts and the breadth of projects in which RWRD participates. We believe these projects not only bring value to our industry, but help to reduce or minimize operational costs for our rate payers. With this first year anniversary of the Water Campus and WEST Center upon us, I look forward to continued innovations and success and as always, we thank you for your continued support.

cc: RWRD ET Members
Tom Burke, Deputy County Administrator
Jan Leshner, Deputy County Administrator
John Moffatt, Admin Support Services Manager
Nanette Slusser, Assistant County Administrator