# MEMORANDUM

Date: February 25, 2014

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

From: C.H. Huckelberry
County Administrator

Re: **Regional Optimization Master Plan Status Report**

Nearly a decade ago, Pima County launched planning efforts for what would become the largest and most complex public works program ever undertaken in the history of Pima County. The Regional Optimization Master Plan (ROMP) was driven by new state environmental standards to improve the quality of effluent discharged from Pima County's wastewater facilities. As outlined in greater detail in the attached report, the program is approaching completion on time and at substantial savings.

The mandated projects are now fully operational. While some ROMP projects at the Tres Ríos Water Reclamation Facility remain, the regulatory-driven upgrade and expansion were completed months ahead of the January 2014 regulatory deadline. The Agua Nueva Water Reclamation Facility was completed a full year ahead of the January 2015 deadline.

In all, the program, originally budgeted at $720 million, came in substantially under budget, with roughly $114 million in savings. The cost at completion is forecasted to be about $605 million. There were two keys to these significant savings:

- effective budget management; and
- the timing of the project, which generally coincided with the 2008 recession and led to competitive pricing for labor and materials. The timing had an added benefit of creating more than 3,000 construction and manufacturing jobs at a time when jobs in those sectors were sorely needed.

The ROMP project has positioned Pima County well for the future by ensuring our wastewater meets stringent new state and federal requirements. Had we not acted to meet these standards, Pima County could have faced steep fines and additional oversight and mandates by regulatory agencies, potentially triggering a growth moratorium. Instead, we now have the capacity to meet the community's needs through the year 2030 and possibly beyond.

The County is now producing effluent that meets the highest possible classification standards, through the upgrade and expansion of the Ina Road facility, which has now been renamed the Tres Ríos Water Reclamation Facility, and through the construction of the brand new Agua Nueva Water Reclamation Facility.

Several other advantages are outlined in the attached report. One of the most significant is that state-of-the-art odor control systems will ensure that travelers on the interstate and residents of nearby Westside neighborhoods will no longer have to endure odors associated with the treatment of sewage on the Westside. Pima County was able to keep its promise to protect employees from losing their jobs, even as the County contracted with a private firm to design, build and operate the Agua Nueva plant. All staff adjustments were made without layoffs. Additionally, a strong emphasis on safety yielded excellent results. There were only four non-life threatening lost time incidents during the more than two million construction man-hours of work at the Tres Ríos facility. There were no lost time incidents in the 880,000 construction man-hours of work at Agua Nueva.

Pima County also was cognizant of our ratepayers' needs. In spite of substantial rate increases that were necessary to fund the improvements, upgrades and expansion, Pima County's rates are still well within the mid-range for sewer utilities nationally. Nevertheless, understanding that some of our poorest customers may struggle with the increases, the Board supported the creation of a Sewer Outreach Subsidy Program, effective July 1, 2011, which provides low-income residents reductions in their bills.

The County's financing plans have been so successful that its latest issuance of sewer revenue obligations has been upgraded from a grade of medium to a grade of high.

The project had a secondary benefit of providing additional recreational opportunities in the vicinity. In addition to aesthetically pleasing architecture and landscaping at the new facilities, a five-mile service road was created that doubles as a multipurpose public walkway and bike path; and improvements to portions along the eastern bank levee of the Santa Cruz River will eventually aid in the development of a linear park.

Although the majority of the ROMP is complete, the Board, in the near term, will be asked to provide direction regarding the future use for the asset that is the now-closed Roger Road plant and support the exploration of ways to transform wastewater treatment byproducts into useful products, whether it be biogas or agricultural fertilizer.

As potable water sources are strained by increasing populations and persistent drought conditions, additional uses of reclaimed water will prove to be a great benefit to the community. We are very pleased we were able to accomplish significant improvement to the quality of the community's reclaimed water that will help the Tucson metropolitan area meet its future water needs.

I have attached a February 14, 2014 memorandum and detailed report on the ROMP program for your additional information and review.

Attachment

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

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February 14, 2014

**TO:** C.H. Huckelberry, County Administrator

**THRU:** John M. Bernal, P.E., Deputy County Administrator – Public Works

**FROM:** Jackson Jenkins, Director

**SUBJECT:** **ROMP Achievements and Status Report**

After almost a decade in the planning, design and construction of the ROMP Program, I am pleased to report that the Program is rapidly approaching completion with major achievements and significant cost savings. I have enclosed a document entitled ROMP Achievements and Status Report. This report describes the many accomplishments and the current status of the ROMP Program.

I particularly would like to highlight the following accomplishments:

1. The mandated regulatory compliance dates to improve the effluent quality discharged to the Santa Cruz River from the Tres Rios WRF by January 30, 2014 and from the Roger Road WRF by January 30, 2015 have been achieved months ahead of these dates.

2. The originally approved budget of $720 million for the ROMP Program has been significantly reduced with a savings of more than $114 million. We are now projecting the cost to complete the Program will be under $606 Million.

3. During the peak of construction of the Program, user rates had to be increased. However, in spite of the multiple years of rate increases, current rates are well within the mid-range for sewer utilities nationally.

4. The County's oldest treatment facility, the Roger Road WRF, has been taken off-line. The decommissioning date was January 8, 2014.

5. Odor control systems have been completed and are operational system wide. These systems are controlling the annoying odors that have been so problematic for County residents in the past.

These accomplishments and many others have been possible due to the strong cooperation from the many stakeholders involved in the Program, including the Board of Supervisors, County Administration, consultants, contractors, other County Departments and most importantly RWRD employees who have managed all the projects and maintained operations in compliance throughout the Program. It is important to recognize those employees who may not have been involved directly with ROMP activities, but ensured the daily activities of the department were carried out successfully in the absence of so many staff members who were dedicated to ROMP projects.

Attachment

CHH, JMB re: ROMP Achievements and Status Report-831.jj

PIMA COUNTY
WASTEWATER RECLAMATION

# Regional Optimization Master Plan

## Achievements and Status Report

### February 2014

*Tres Rios Water Reclamation Facility*

*Agua Nueva Water Reclamation Facility*

**Jackson Jenkins, *Director***
**Regional Wastewater Reclamation Department**

# TABLE OF CONTENTS


Introduction 1

Romp Program 3
- Romp Delivery Methods 3
- Tres Rios WRF 3
- Agua Nueva WRF 4
- Plant Interconnect 5
- Water and Energy Sustainability Center 5
- Decommissioning of the Roger Road WRF 6
- Supervisory Control and Data Acquisition (SCADA) 6
- Security 6
- Ongoing Romp Projects 7
- Biogas Sale and Utilization 7
- Struvite Recovery 7
- Repurposing of the Roger Road WRF 7
- Upgrading of the Administration and Central Maintenance Buildings 7
- Exceptional Work by RWRD Employees 7

Schedule Performance 8

Budget Performance 9

Financing/Rates 11
- Funding Plan 11
- Rate Increase Plan 13
- Financing Benefits 14

Associated Benefits 14
- Safety Program 15
- WRF Work Environments 16
- Odor Control 16
- Security 17
- Tres Rios WRF Energy Master Plan 18
- Staffing 19
- Sustainability 19
- Water Conservation and Management 19
- Renewable Energy and Conservation 20

Solar Energy 20
Carbon Footprint Reduction 21
Green Building 21
Side-Stream Treatment 21

Remaining Projects 22
Total Trihalomethane Control 22
Renovations of Facilities Not Included in the Tres Rios WRF Upgrade 22
Performance Model 22

Conclusions 23

Appendix – Award, Recognitions, Accolades 25

## Figures

FIGURE 1 ROMP CIP Programs 3
FIGURE 2 ROMP Schedule Performance 9
FIGURE 3 ROMP Budget/Expenditure Performance 10
FIGURE 4 Cost Performance 10
FIGURE 5 ROMP Expenditures by Year 12
FIGURE 6 User Fee Rates 13

## Tables

TABLE 1 Budget Performance 10
TABLE 2 Project Delivery 11

## INTRODUCTION

With hard work and determination, Pima County Regional Wastewater Reclamation Department (RWRD) has completed all the mandated projects in the regulatory-driven Regional Optimization Master Plan (ROMP). This aggressive plan was designed and constructed to expand and upgrade infrastructure to meet new and regulatory mandates and potential future requirements. It also provides for the wastewater capacity needs of the community for the next several decades. All the regulatory-required infrastructure is now in operation, and work on other ROMP-related projects is well underway.

The success of the ROMP is directly related to the substantial efforts of many dedicated RWRD staff, elected officials, stakeholders, consultants and contractors. The completed ROMP projects met original scope goals and objectives and were completed on or ahead of schedule. Almost all were completed significantly under budget. To date, the overall ROMP Program has saved more than $100 million from the original $720 million budget. These accomplishments will benefit all the customers of RWRD well into the future.

The ROMP Program was initially commissioned as a result of a new 2005 regulatory requirement to improve the quality of the effluent discharged to the Santa Cruz River from Pima County's Ina Road and Roger Road *Wastewater* Reclamation Facilities (WRF). (The Ina Road WRF was recently renamed the Tres Rios *Water* Reclamation Facility [WRF].) In anticipation of the substantial expense to comply with this regulatory requirement, RWRD engaged consultants and impacted stakeholders. The group evaluated the community's aging wastewater infrastructure along with best approaches to meet new environmental standards. In-depth dialogue and consultation with this diverse group of experts and community partners led to the development of the ROMP.

The nationally recognized firm of Greeley and Hansen was selected as the program manager. Greeley and Hansen oversaw a team of sub-consultants with expertise in a wide variety of disciplines including wastewater treatment processes, project procurement methods, legal matters and financial issues.

As the plan emerged, it became apparent that in addition to the regulatory requirements, the ROMP would have to address the aging condition and capacity of existing infrastructure. A series of 17 stakeholder workshops were conducted by the RWRD and its consultants. Active input was received from stakeholders as community needs related to the conveyance and treatment of wastewater were identified. Through these workshops the following program goals were identified and developed:

- Improve the quality of effluent discharges to the Santa Cruz River from the Ina Road WRF by January 30, 2014 and from the Roger Road WRF by January 30, 2015 in compliance with regulatory requirements. The effluent quality improvement would be realized primarily through the reduction of nutrients in the effluent resulting in improvements to the Santa Cruz River ecosystem and its underlying groundwater aquifer.
- Provide wastewater treatment capacity to meet the needs of a majority of Pima County residents for at least 25 years into the future.
- Upgrade or replace aging infrastructure of both major regional wastewater treatment facilities. Initial components of the Roger Road WRF date back to the early 1950s. Components of the Ina Road WRF date back to the 1970s.

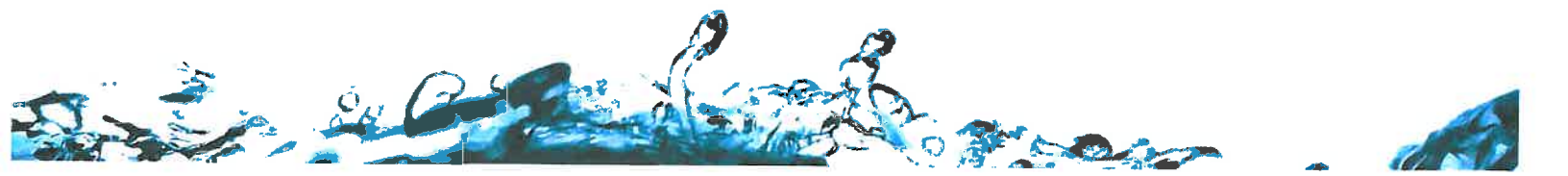
- Incorporate features that can more cost effectively integrate projected future regulatory requirements.
- Implement a good neighbor policy for the surrounding communities by incorporating odor control technology in the ROMP facilities to prevent odors from affecting nearby homes and businesses.
- Incorporate architectural features and landscaping that are attractive and compatible with the surrounding communities.
- Provide a safe workplace for employees of the regional systems.
- Develop a program budget and financial plan to fund the improvements while ensuring rate increases do not become a hardship for the system's ratepayers, who pay for the improvements.

As the ROMP was developed, these goals were incorporated into a plan which was finalized with a not-to-exceed budget of $720 million. As a consequence of the goals and resulting plan, the ROMP became the largest and most complex public works program ever undertaken in the history of Pima County.
Stakeholders involved in the development of the ROMP Program included the following:

- Pima County Board of Supervisors
- Pima County Administration
- Pima County Flood Control District
- Pima County Cultural Resources Department
- Pima County Attorney's Office
- Pima County Natural Resources Parks and Recreation Department
- Regional Wastewater Reclamation Advisory Committee
- City of Tucson Water Department
- Town of Marana
- Town of Oro Valley Water District
- Tucson Audubon Society
- U.S. Army Corp of Engineers
- University of Arizona
- Metropolitan Water District
- Flowing Wells Coalition and Neighborhood Association
- Tucson Mountains Association

The recommended ROMP Program was presented to Pima County Administration, the Pima County Board of Supervisors, and the Arizona Department of Environmental Quality (ADEQ) for approval in the fall of 2007. The Board of Supervisors authorized RWRD to move ahead and implement the Program later that year.

As will be reported below, all of the established goals of the ROMP Program have been achieved substantially below the established Program Budget and in advance of all regulatory compliance dates. Although all mandated requirements and other major elements of the ROMP have been achieved, some ROMP projects remain. All ROMP projects (both those that are completed and those that are underway) will be described in this report.



## ROMP PROGRAM

Compliance with the new ADEQ environmental standards required significant infrastructure additions and modifications at the two major metropolitan wastewater reclamation facilities. In addition, a new major interceptor between the facilities was needed. The ROMP Capital Improvement Program includes seven specific projects that are listed in **Figure 1**.

*Tres Rios WRF digester complex*

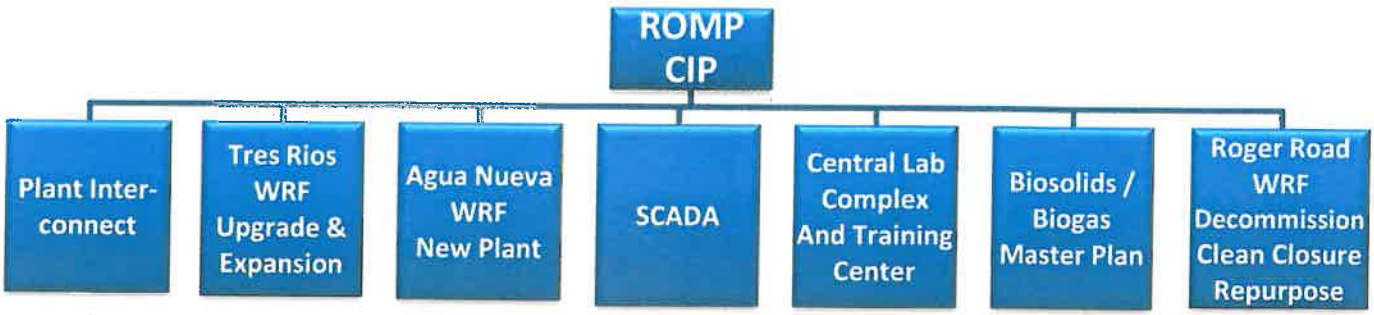
### ROMP DELIVERY METHODS

#### *Tres Rios WRF*

To meet the regulatory wastewater and capacity treatment requirements, the Tres Rios WRF treatment process was upgraded and expanded from a rated capacity of 37.5 million gallons per day (MGD) to 50 MGD to meet the new regulatory requirements and future capacity needs at the Tres Rios facility, the following upgrades retrofits and additions were needed:

- The retirement of the high purity oxygen activated sludge wastewater treatment process constructed in the 1970s;
- Upgrades to the Biological Nutrient Return Activated Sludge (BNRAS) system that was placed into service in 2006;
- Additions to the anaerobic digestion system;
- Centralization of sludge handling and treatment systems for the entire County; and
- A variety of other system upgrades and modifications to the existing facilities.
- Expansion of the headworks, including screening, pumping and grit removal systems;
- Expansion of the primary treatment facilities;
- Construction of four trains of a modified 5-stage Bardenpho wastewater treatment system with bioreactors and clarifiers;
- Construction of three gravity belt sludge thickeners;
- Construction of two new anaerobic digesters;
- Expansion of disinfection facilities;
- Upgrade of three sludge dewatering units;
- Installation of two sludge

***FIGURE 1 ROMP CIP Programs***



storage tanks;
- Construction of a new enclosed digester gas flare;
- Construction of a new operations control center;
- Construction of a new warehouse;
- Upgrade of the existing administration building;
- Upgrade of the central maintenance center;
- Construction of plant-wide odor control systems;
- Construction of a plant-wide security system; and
- Improvements to landscaping and security fencing.

These additions and improvements were carefully sequenced to maintain treatment facility operations while construction occurred in and around the ongoing operations activities. As a tribute to flexibility and adaptability of the plant operations and maintenance staff, regulatory compliance was maintained throughout the entire construction period.

### *Agua Nueva WRF*

The antiquated Roger Road WRF was constructed in the 1950s and had reached the end of its useful life. Rehabilitation and retrofit of the existing plant with modern nutrient removal capabilities would have been more costly than the construction of a new facility. The decision not to improve the Roger Road WRF led to the design of the Agua Nueva WRF. The 32 MGD Agua Nueva facility was constructed at the same time that the Tres Rios WRF expansion and upgrades were underway five miles to the north. Effluent generated at the Roger Road WRF served as the water source for the city of Tucson's reclaimed water system. Today, the Agua Nueva WRF supplies much higher-quality reclaimed water to the city's system.

*Agua Nueva WRF aerial view*

The Agua Nueva WRF includes the following features:

- Headworks structure for raw wastewater screening and pumping;
- Grit removal ahead of innovative dissolved air flotation thickeners;
- Four modified 5-stage Bardenpho wastewater treatment system bioreactors and clarifiers;
- Disk filters;
- Sodium hypochlorite disinfection;
- A sludge pumping station for conveyance of sludge to the Tres Rios WRF by a dedicated force main;
- Plant-wide odor control systems;
- Plant security system; and
- Landscaping and external architectural screening walls pleasing to the adjacent communities.

The outfall serving the Agua Nueva facility is the same one that served the Roger Road WRF. Using the same outfall saved the costs of a new outfall, related permitting costs, and time delays. Construction of the Agua Nueva facility proceeded without interference or disruption of ongoing

operations of the Roger Road WRF. The project delivery method saved Pima County more than $75 million in construction costs.

***Today, the Agua Nueva WRF supplies much higher-quality reclaimed water to the city's system.***

### Plant Interconnect

The plant interconnect pipeline is an interceptor sewer that transfers some of the flows from the now-decommissioned Roger Road WRF service area to the Tres Rios WRF. The interceptor balances the flow between the Agua Nueva and Tres Rios WRFs to optimize the infrastructure capacity at each facility. The plant interconnect pipeline is five miles in length with pipe sizes ranging from 60-inches to 72-inches in diameter. The interceptor crosses two rivers and incorporates state-of-the-art odor control. Flows in the interceptor range from 25 MGD under normal conditions to over 120 MGD during wet weather events.

*Construction of the Plant Interconnect*

### Water and Energy Sustainability Center (WESC)

The central laboratory is located in the Water and Energy Sustainability Center (WESC). Wastewater laboratory testing and reporting requirements have grown significantly over the years and the new treatment requirements have increased the laboratory processing burdens. Previously the laboratory functions and operations were scattered among several locations around the old Ina Road WRF in spaces largely inadequate for the tasks. Consequently, a centralized laboratory was constructed north of the Agua Nueva WRF to provide regulatory testing, monitoring, reporting, and archiving of all discharge monitoring reports for Pima County's nine water reclamation facilities.

The new laboratory brings the lab functions within one structure for more efficient operations and communications. The central laboratory complex also serves as the center for the industrial waste control program and a multi-purpose training center. The training center provides mandatory safety instruction and continuous wastewater technology training for new and existing RWRD staff.

*WESC exterior*

The WESC complex has been designated a Silver LEED building. (LEED stands for Leadership in Energy and Environmental Design; it is a system that rates buildings and facilities according to their green features.)

In anticipation of increases in required testing and complex laboratory analyses, plans for an additional laboratory wing were developed. Due to conditions in the construction market at the time of the WESC construction, the cost of the central laboratory facility was well-below the original budget. The savings realized through beneficial market conditions will more than cover the costs associated with the construction of an additional wing. With market conditions still benefitting the owner, RWRD is proceeding with the construction of the new wing.

***The WESC complex has been designated a Silver LEED building.***

### *Decommissioning of the Roger Road WRF*

Decommissioning of the Roger Road WRF occurred on January 8, 2014 after more than 60 years of continuous operations. On this date all wastewater flows to the plant were transferred to the new Agua Nueva WRF and the Tres Rios WRF. Concrete plugs were poured into the Roger Road WRF plant influent sewers and effluent pipeline to prevent the conveyance of any more wastewater to the old facility. To meet ADEQ clean closure requirements, all residual water and solids were removed, and all plant tankage, chambers and lines are now being cleaned. With the clean closure approval by ADEQ, the Roger Road WRF has been removed from ADEQ's wastewater facility register, and the plant now can be deconstructed or repurposed.

### *Supervisory Control and Data Acquisition (SCADA)*

A key element in the modernization of wastewater treatment facilities is the use of supervisory control and data acquisition (SCADA) systems. SCADA is a computerized/electronic system that augments automation at the wastewater treatment facilities and monitors flows in the sanitary sewer system. Upgrades at the Tres Rios facility included significant improvements to the existing SCADA system, and new construction at Agua Nueva included SCADA technology. A robust SCADA system permits efficient operations, automation, and process control to enhance management and day-to-day maintenance routines for improved equipment and system life-cycle performance. The new Operations Control Center (OCC) at the Tres Rios WRF contains SCADA system-control hardware and software algorithms for plant automation as well as a report generation and long- term data archiving. The SCADA system replaces manual collection of data and log books with electronic records. The new SCADA system allows the plants to be operated and maintained efficiently and effectively. It also provides monitoring of security conditions system wide.

The OCC SCADA system provides 24/7 centralized monitoring and control of the entire RWRD wastewater system, including treatment plants and pump stations.

### *Security*

With facility upgrades, security systems, including software, cameras, and access gate controls were installed at the plants to comply with the Department of Homeland Security and U.S. Environmental Protection Agency guidelines for critical infrastructure. The new security systems can detect illegal entries and continuously monitor all

vehicles entering or leaving each site for protection of these vital community assets.

### Ongoing ROMP Projects

With substantial completion of the two regional water reclamation facilities, ADEQ's environmental requirements have been met. However, there are some projects in the massive ROMP Program that must still be completed. Continuing projects include:

- Biogas Sale and Utilization;
- Struvite Recovery;
- Repurposing of the Roger Road WRF;
- Upgrading of the Tres Rios WRF Administration Facility and Central Maintenance Facility; and
- Closeout of the ROMP Program.

### Biogas Sale and Utilization

Under the County sustainability program the Biogas Utilization Project will convert wasted digester gas that is currently being flared into a beneficial natural gas-like commodity to generate revenue for RWRD. The project will be designed, built, financed, owned and operated commercially by a third party. Revenue generated by the project will benefit ratepayers by offsetting a portion of the plant operations and maintenance costs.

***With substantial completion of the two regional water reclamation facilities, ADEQ's environmental requirements have been met.***

### Struvite Recovery

The struvite recovery project will reduce or eliminate the use and handling of corrosive chemicals at the Tres Rios WRF. It also will reduce the volume of sludge requiring disposal and the amount of power needed in the mainstream treatment system. Recovery will generate a fertilizer product that can be used in the local agricultural market, thereby generating revenue for RWRD. This is another sustainability program initiative with internal cost savings and external community benefits.

### Repurposing of the Roger Road WRF

Upon clean closure of the 46-acre Roger Road WRF, there will be an opportunity to repurpose the entire site or portions of the site, for alternative County, commercial or community uses. RWRD is exploring potential uses of the decommissioned facility that would best serve the ratepayers and stakeholders.

### Upgrading of the Administration and Central Maintenance Buildings

The aging Administration and Central Maintenance Facilities at the Tres Rios WRF were scheduled for upgrading after the new Central Laboratory and Operations Control Center were constructed. This saved moving costs by relocating most staff once and not twice. The remodeled facilities are projected to be completed by the second quarter of 2014.

### Exceptional Work by RWRD Employees

Employees at the Roger Road and Ina Road WRFs are to be commended for their efforts over the course of numerous ROMP activities. Roger Road WRF employees were challenged to keep aged infrastructure in service to meet regulatory compliance for six-years with minimal investments to or repair of the existing treatment facility. Tres Rios WRF employees had the challenge of meeting regulatory compliance when nearly every part of that

*RWRD staff at Tres Rios*

facility was being upgraded, modified, or replaced with modern infrastructure and systems. A steady diet of change and interruptions were constant during the course of 6-years of ongoing major construction. In both cases, the RWRD operations and maintenance staff members were able to meet all permit requirements. They are to be commended for their tolerance and perseverance through the trials of major construction. Continued regulatory compliance during the extended period of construction is a tribute to the men and women of RWRD's Treatment Division staff.

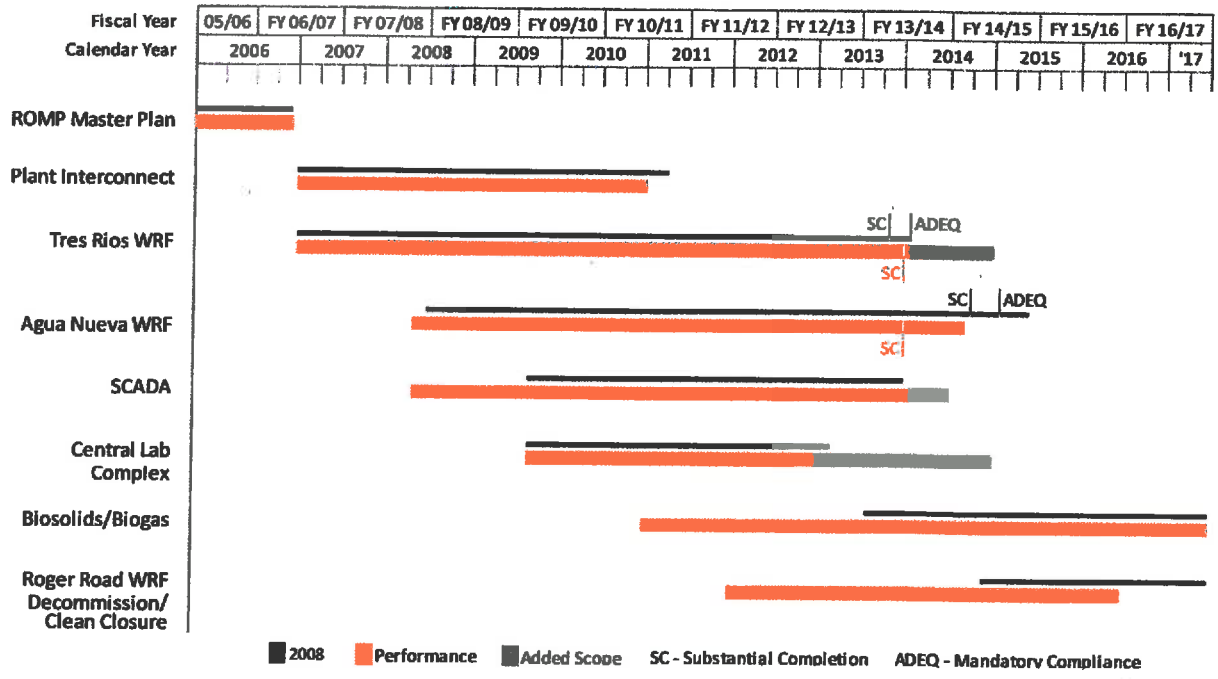
RWRD's construction Engineering Managers also played a key role by monitoring quality, schedule, and budget concerns and by addressing owner-related issues of the various ROMP projects. Their efforts contributed to the steady advancement of the construction work to achieve the goals of the regulatory mandates on time and under budget.

*RWRD staff at work*

## SCHEDULE PERFORMANCE

ADEQ mandated that the Tres Rios WRF be upgraded to discharge effluent that meets stringent standards by January 30, 2014. The Agua Nueva WRF was mandated to meet the same stringent standards by January 30, 2015. Significant daily penalties were to be levied for noncompliance. The overall ROMP Program Schedule was predicated on these two dates. Subsequently, all design and construction projects were commissioned to meet the ADEQ mandates. The ADEQ compliance dates were met in advance of contractual target dates required of the construction contractors, and well in advance of the dates set forth by ADEQ. At the Tres Rios WRF, the compliance date would not have been achieved without the cooperation of the facility's operations and maintenance staff. These RWRD employees assisted contractors by overseeing switchovers, tie–ins, transfers, tap-ins and other activities that made the transitions from old systems to new systems as seamless as possible. The RWRD management team was able to achieve schedule performance success by having **all ROMP projects meet or exceed project completion on or prior to the original ROMP schedules.** This is illustrated by presenting the original schedule with ADEQ milestones shown against actual schedule performance in **Figure 2**.

*FIGURE 2 ROMP Schedule Performance*




## BUDGET PERFORMANCE

The original budget for the ROMP was set at $720,010,000. This was based on the scope of each of the ROMP Projects and the projected timeframe when each of the projects was to be constructed. As the projects were developed during the design and construction phases, there were opportunities to reduce costs through value engineering or project delivery approaches, while still fulfilling goals and objectives set forth in the scope of the original projects.

Value engineering workshops and techniques were applied to the major projects in the ROMP Program. Independent review teams proposed more than 100 value engineering recommendations. Nearly one-half of those recommendations were accepted, resulting in over $20 million in construction cost savings and improved operational efficiencies. Examples of these cost savings include: eliminating a primary clarifier; reducing depth of sewer line coverage; reducing number of manholes; reducing volume of anaerobic digesters by increasing solids concentrations; pre-purchasing concrete and steel to save inflation costs, eliminating aqueous ammonia storage; and sequencing of construction allowing for an earlier start.

Additional savings were realized through the decision to use enhanced chlorination for disinfection instead of the originally-proposed ultraviolet disinfection process. This decision saved millions of dollars in construction and O&M costs.

While the cost of two of the ROMP projects have increased slightly due to scope increases, the total cost of the ROMP Program is well under the original budget. The cost at completion is forecasted to be just over $605 million, **$114 million below the original ROMP budget of $720 million. This is $114**

**million that ratepayers will not have to pay for in their monthly sewer bills.** The budget performance is shown in **Table 1.**

With effective budget management, the project was able to achieve a reduction in the program budget without sacrifice or reduction in scope. The program budget versus project expenditure over time by fiscal year is shown in **Figure 3.**

As with schedule performance, budget performance for the ROMP program tracked well against the original baseline. This allowed for the County Finance Department to effectively plan for acquisition of funds to pay for the investments. Project expenditures as of January 1, 2014 were $543.1 million to reach substantial completion on the major ROMP projects. The remaining budget is for continuing ROMP project efforts and program closeout. Expenditure against planned costs is shown in **Figure 4.**

Project delivery selection was a key element in achieving the ROMP Program cost savings and for meeting schedule objectives. Construction-manager-at-risk projects brought the contractors into the projects early to develop construction price certainty, provide schedule

***TABLE 1 Budget Performance***

| ROMP | Baseline Budget Jul 2008 | Current Budget Feb 2014 | Current Budget Savings | Forecast Budget at Complete | Budget Savings at Complete |
|---|---|---|---|---|---|
| | *(In Millions)* | | | | |
| Plant Interconnect | 41.2 | 33.2 | 8.0 | 33.2 | 8.0 |
| Tres Rios | 301.3 | 313.2 | (11.9) | 313.9 | (12.6) |
| Exist. Structures Rehab | 0 | 9.0 | (9.0) | 9.0 | 0 |
| Agua Nueva WRF | 275.1 | 188.2 | 86.9 | 174.0 | 101.1 |
| SCADA | 13.5 | 13.9 | (0.5) | 13.9 | (0.5) |
| Central Lab complex | 28.9 | 27.5 | 1.3 | 27.5 | 1.4 |
| Biosolids/Biogas | 21.8 | 21.8 | 0 | 21.8 | 0 |
| Roger Road WRF | 38.3 | 38.1 | 0.2 | 12.3 | 26.0 |

***FIGURE 3 ROMP Budget/Expenditure Performance***

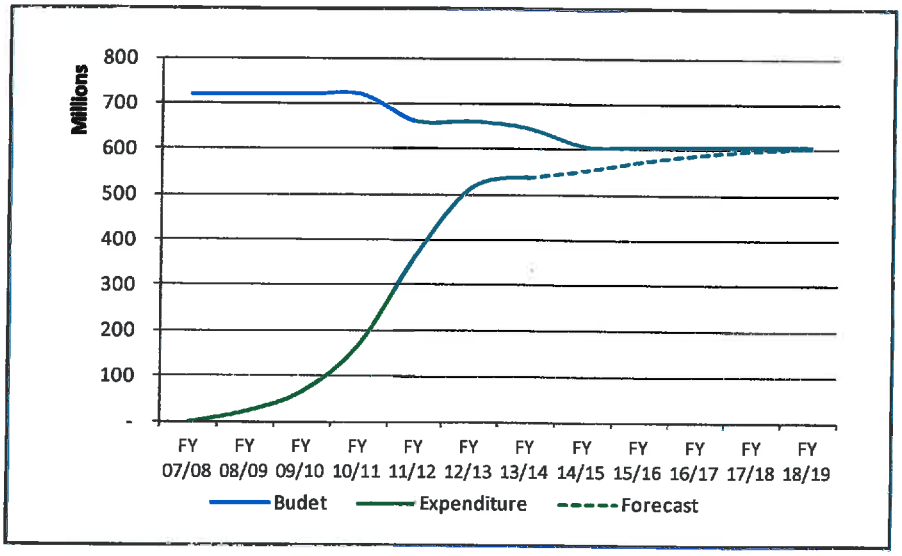
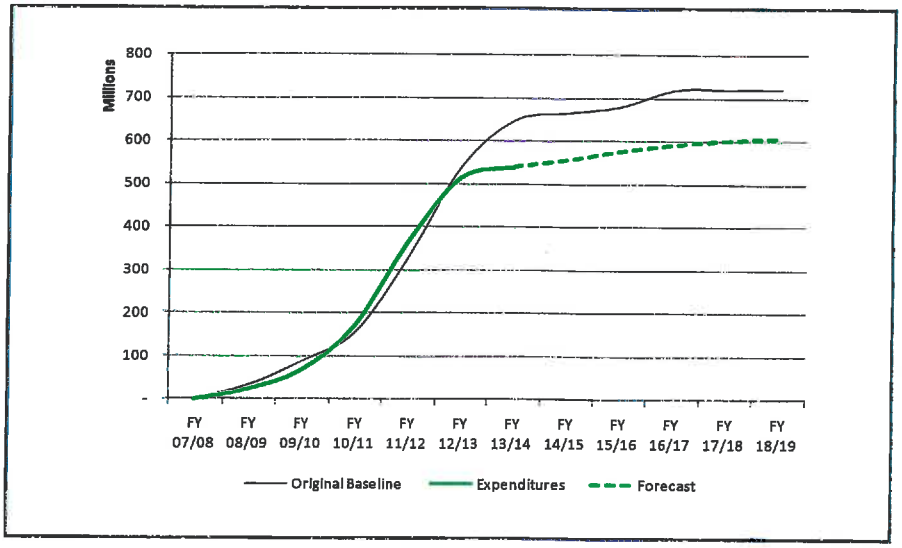



***FIGURE 4 Cost Performance***



management and conduct constructability reviews. Design-Build projects were able to save time and money through innovative solutions and expedited delivery.

The Tres Rios WRF was constructed through a construction-manager-at-risk delivery under a series of eight guaranteed maximum price and lump sum contracts to expedite construction in coordination with design development. The innovative and cost effective design-build-operate (DBO) project delivery approach used for the procurement of the Agua Nueva WRF yielded a savings of more than $75 million. Project deliveries for the ROMP Program are provided in **Table 2.**

Goals of each ROMP project were to meet ADEQ deadlines, accomplish project scope objectives, and come in at or under budget. To accomplish these goals, the Program Management Team established a single management system that tracked projects by scope, work, schedule, time, and money. Since this system was used on every ROMP project, team members were easily able to determine the project status with regard to: amount of work actually completed; forecasts of costs and completion dates; compliance with project schedules; and real time budget tracking. Simply, this system has and continues to provide information that allows team members to manage the scope, schedule and budget for each project. This has ensured that RWRD receives what it has paid for and forecasts probable future outcomes based on current status.

***TABLE 2 Project Delivery***

| Project | Project Delivery |
|---|---|
| Plant Interconnect | Construction Manager at Risk |
| Tres Rios WRF | Construction Manager at Risk |
| Agua Nueva WRF | Design Build Operate |
| SCADA | Design Build |
| Central Lab Complex | Design Bid Build |
| Biosolids / Biogas | Design Build Finance Own Operate |
| Roger Road WRF Decommissioning / Repurpose | To Be Determined |

The Tres Rios WRF Expansion and Upgrade Project was the largest and most complex project in the ROMP Program. Well-operating systems were used successfully to manage and control thousands of construction activities, maintain plant operations, and achieve facilities shut-downs as necessary. The structured management system allowed RWRD to effectively meet ADEQ compliance requirements.

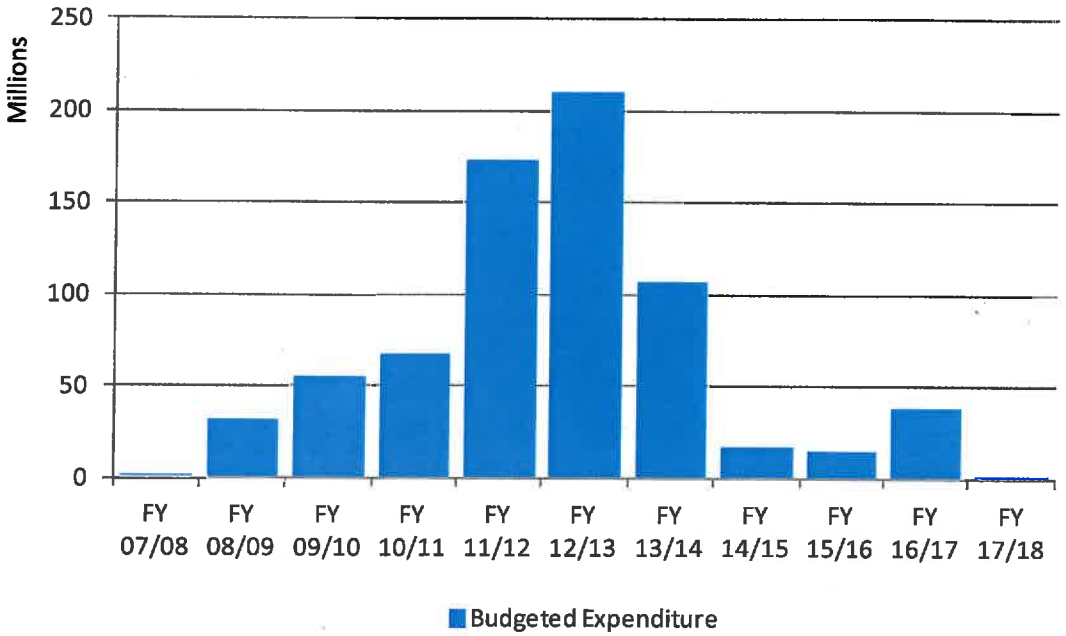
## FINANCING/RATES

With an established budget of $720 million to complete the ROMP, RWRD retained Raftelis Financial Consultants (RFC) to develop concepts of how the program could be funded and paid for by the ratepayers. RFC is a nationally recognized financial consultant with expertise in the water sector. The firm developed concepts that were presented to the County's Finance and Risk Management Department (FRMD). Based on RFC's concepts, FRMD developed a detailed Financial Plan. The plan included proposals for funding and rate increases that would cover the financial needs of the ROMP construction demands at the least possible impact to the rate payers.

### *Funding Plan*

Historically, Pima County has used sewer revenue bonds,

*FIGURE 5 ROMP Expenditures by Year*




Arizona's Water Infrastructure Finance Authority (WIFA) loans, and Certificates of Participation to finance RWRD's capital improvement program (CIP) projects. By 2010 the County had issued all of the previously authorized sewer revenue bonds and could not issue new bonds without a voter approval.

In Fiscal Year (F/Y) 2009/10, the County had issued the last of the remaining bonds authorized in the 1997 and 2004 bond elections. To cover the $720 million ROMP mandates, previous Financial Plans had anticipated bond elections in 2008 and in 2012. However, due to the economic circumstance presented by the recession and weak recovery, the County never set a date for those elections.

After exploring various capital funding options, the County determined that the issuance of "sewer system revenue obligations" would be the most efficient means of funding ROMP and RWRD's other projects. These obligations were subordinate to existing sewer revenue bonds and WIFA loans. As security for its payment obligations, the County would pledge the net revenues from the sewer system.

Sewer obligations are similar to revenue bonds in that they are paid solely from the revenues generated by the utility through fees. Obligations differ from bonds, though, in that they are not based on (and do not encumber) the full faith and credit of the County. Although sewer system obligations generally carry a slightly higher interest rate than sewer revenue bonds, they are typically sold at interest rates that are substantially similar to the rates the County would pay if it sold sewer revenue bonds.

The specific funding solution developed by the County was to issue sewer revenue obligations with interest-only payments for the first three years. Principal payments would be deferred until the fourth year for each of the first three years of debt issues. This reduced the debt

service requirements for the next five years of payments.

RWRD considered funding the ROMP through WIFA. However, when analyzed closely, it was determined that financing through WIFA would require steep repayment costs in the early years of the ROMP. This financing structure would have resulted in higher rate increases in the earlier years of the ROMP, placing an increased burden on our ratepayers. For this reason, WIFA financing was not recommended. However, when WIFA received funding from the federal stimulus package to focus on infrastructure reinvestment, RWRD inquired into possibilities that might yield a financial benefit for the department's customers.

The Plant Interconnect Project, was deemed a "shovel-ready" project and therefore eligible for federal support under the American Recovery and Reinvestment Act. Ultimately, approximately $10 million were borrowed from WIFA in 2009 at a reduced interest rate for long-term repayment for the Plant Interconnect project.

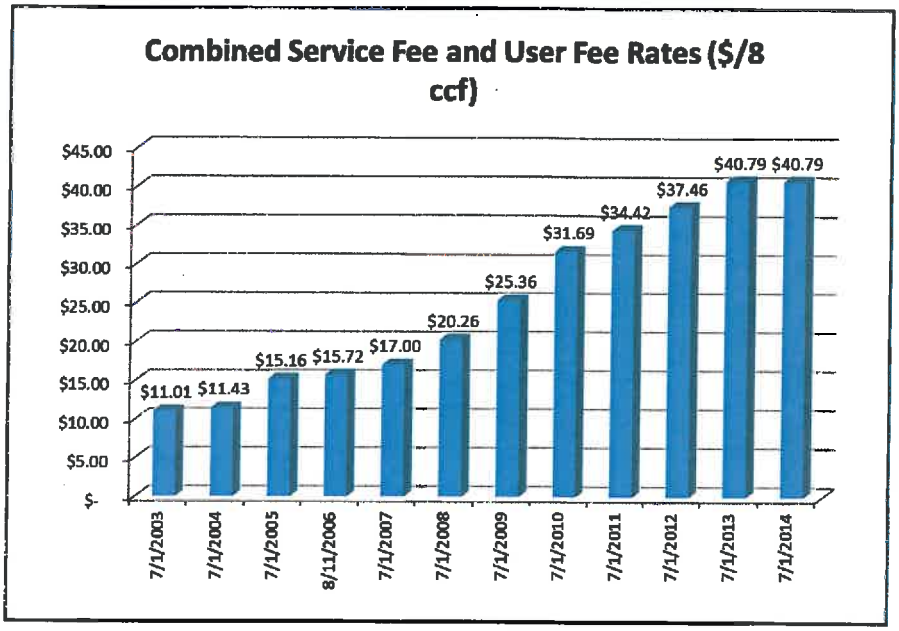
Based on RWRD's application, WIFA later granted the County a "principal forgiveness" of $2 million on that loan. This was part of the economic stimulus initiative for Clean Water State Revolving Funds, overseen in Arizona by WIFA. Essentially, $2 million of the original $10 million became "free" money for RWRD.

### Rate Increase Plan

During the early 2000s, Pima County's sewer-user fees were among the lowest in the United States, averaging around $11.00 per month for a typical residential household. These artificially low rates resulted in an underfunded utility that experienced serious system-maintenance and financial-management issues during this period. Crumbling infrastructure (both plants and pipes) was evidence of this critical situation. To prepare for compliance with ROMP mandates and to address these other infrastructure issues, the County approved minor rate increases (4-8%) in FYs 2004/05 and 2005/06. More moderate increases (12-15%) were approved in FYs 2006/07 and 2007/08. Major increase (22-26%) followed in FYs 2008/09 and 2009/10.

The need to fund the County's $720 million ROMP Program resulted in highly significant increases in the County's annual Capital Improvement Plan costs. These increases in costs, coupled with the decline in billable flows due to the recession and weak recovery, dictated that rates and charges be increased again in order to ensure that revenue was sufficient to cover system costs. To this end, the 2010 Financial Plan

*FIGURE 6 User Fee Rates*



provided a schedule of rate increases that focused on generating sufficient revenue to meet construction needs for ROMP and aged infrastructure replacement over the next five years. To meet the requirements of the ROMP funding plan, the County continued raising rates at a moderate level (10%) for the next four fiscal years (FYs 2010/11, 2011/12, 2012/13 and 2013/14). The rate recommendations, as approved by the Board of Supervisors, were for increases primarily applied to the volume rate that sewer bills are based on. Although standard service fees and connection fees were also raised during those same years, these increases yielded only a small rise in revenues.

The result of this long series of increases has been to raise the typical residential household's average sewer-user fee to nearly $41.00 per month. The impacts of the Board-approved increases over this period of time on a residential customer producing an average 8 CCF of wastewater flow are shown in Figure 6.

Using the latest national figures for comparison, in 2012 the average sewer service charge in the United States was about $34.00 per month. In 2012, the average residential sewer bill in Pima County was $37.00 a month. However in 2012, some U.S. utilities had average monthly bills of about $100.00. In spite of the multiple years with rate increases, Pima County's rates are still well within the midrange for sewer utilities nationally.

***The ROMP Program...is the largest public works capital improvement program ever undertaken in the history of Pima County.***

Nonetheless, understanding that the steep increases were creating a hardship for our low-income customers, the Pima County Board of Supervisors approved the Sewer Outreach Subsidy (SOS) Program providing low-income residents reductions in their bills. The SOS Program went into effect on July 1, 2011.

### *Financing Benefits*

The existing rates were determined assuming that the future rate covenants might allow surpluses in the Operating Reserve Fund (i.e., unrestricted cash balances) which could then be applied toward existing debt. Based on the audited and projected revenues, beginning in FY 2013/14, the County will be able to use a portion of the unrestricted cash balances to prepay existing bond debt and WIFA loans, thus reducing the overall sewer debt and debt-service costs for RWRD ratepayers.

Critical to the County's sewer revenue bond and obligation sales are ratings by investor service agencies such as Fitch, Standard & Poor's, and Moody's. In 2009, the agencies downgraded their ratings on the County's previous voter-approved sewer revenue bonds. The agencies noted that the County had historically adopted only modest rate increases. They acknowledged that since 2006, rate increases had become larger, sewer fees were not sufficient to match the rate of growth in expenditures. The ROMP-era rate increases were needed to address the declining debt service coverage and to prevent further downgrading by the rating agencies, which would be followed by increases in interest rates. The County's financing plans have been so successful that its latest issuance of sewer revenue obligations has been upgraded from a grade of medium to a grade of high.

## ASSOCIATED BENEFITS

The ROMP Program with a budget of $720 million is the

*Construction at one of RWRD's wastewater reclamation facilities*

largest public works capital improvement program ever undertaken in the history of Pima County. The beginning of the ROMP construction generally coincided with the recession that began in 2008, thus providing local construction jobs in a field that was losing jobs. Over the years, the ROMP Program created more than 3,000 construction and manufacturing jobs most of which drew from local labor pools. In addition, during these same years, ROMP pumped more than $540 million into the local, regional and national economies.

During the ROMP construction, thousands of mechanical and electronic components were installed, 85,000 cubic-yards of concrete were poured, and 10,000 tons of steel were used. Moreover, nearly 3,000,000 labor hours went into the construction of the ROMP facilities.

With input from various stakeholders, RWRD adopted a number of goals that were beneficial to the community and made sense within the parameters of the ROMP Program.

- Incorporation of state-of-the-art odor control systems in the Plant Interconnect, Agua Nueva WRF, and upgraded and expanded Tres Rios WRF.
- Incorporation of architecture, landscaping and other aesthetically pleasing features at the Tres Rios and Agua Nueva WRFs.
- Construction of a five mile service road above the Plant Interconnect that doubles as a multi-purpose public walkway and bike path.
- Improvements to portions along the eastern bank levee of the Santa Cruz River that will eventually aid in the development of a Linear Park.
- Improvements in the discharged waters into the Santa Cruz River to upgrade riparian habitats and bird sanctuaries.

Significant improvement to the quality of the community's reclaimed water that will help the Tucson metropolitan area meet its future water needs.

### *Safety Program*

Because of the multi-year massive and complex construction projects, RWRD adopted a comprehensive "safety first program." This program placed a keen focus and awareness on safety in the daily lives of everyone who worked at the construction sites. The safety program consisted of multiple practices:

- Each ROMP meeting was opened with a safety moment during which at least one participant would cite a safety experience or make a safety recommendation;
- All visitors received safety training before entering work sites;

- All workers and visitors had to wear mandatory safety apparel whenever they were on a construction site; and
- Safety inspections were a continuous practice at all construction sites.

***At the Tres Rios WRF project, there were only four non-life threatening lost time incidents in the 2,053,000 construction man-hours of work.***

This strong emphasis on safety yielded excellent results. At the Tres Rios WRF project, there were only four non-life threatening lost time incidents in the 2,053,000 construction man-hours of work. This record results in an "excellent" rating (0.4) in OSHA's DART category. DART stands for "Days Away Restricted or Transferred" and represents the number of days an injured worker cannot work, has restricted work, or is transferred due to an injury.

The national average is 1.0. At the Agua Nueva WRF construction site, there were no lost time incidents in the 880,000 construction man-hours of work to date which results in a DART rate of zero.

All those who have been involved in or associated with the construction at the Agua Nueva WRF deserve high praise for this outstanding achievement.

### *WRF Work Environments*

Prior to the ROMP Program, working conditions at the treatment facilities were rated as substandard. In response, a goal was established to ensure facilities were adequate, safe and amenable to Treatment Division employees. Both treatment facilities now feature locker rooms and changing areas; restrooms in strategic onsite locations; American with Disabilities Act compliant accommodations; appropriate indoor and outdoor lighting; and lunch rooms that are separated from process and heavy mechanical work areas.

### *Odor Control*

A major long-standing community issue has been nuisance odors emitted at various locations in Pima County's wastewater systems and infrastructure. Particularly foul odors were emitted into the surrounding communities near the Roger Road WRF. These odors also affected the "gateway" interstate highway into the Tucson metropolitan areas.

This wide-spread community annoyance was addressed very early in the ROMP Program by the development of a system-wide odor control master plan. The goals of the master plan were set forth with the strong input and assistance from a Citizens Involvement Committee (CIC). The CIC was made up largely of residents and business

*Odor control systems at Tres Rios WRF*

owners from the impacted area.

The Master Plan approach was to immediately install interim odor control facilities at major odor emission sources. These temporary odor control efforts were placed in service until the permanent state-of-the-art odor control systems came on line with the startup of the Tres Rios and Agua Nueva WRFs. Inclusion of odor control technology was an important feature of the Plant Interconnect, and other major sewer interceptors feeding into the two facilities. The interim odor control efforts were successful in substantially reducing odor emissions from the Roger Road WRF until it was decommissioned on January 8, 2014.

*Odor control systems at Agua Nueva WRF*

The odor control master plan called for state-of-the-art odor control systems at all ROMP projects, at all sub-regional treatment facilities and throughout the wastewater conveyance system. To ensure that odor-causing gases were collected and treated, RWRD created a dedicated full-time odor control team, a 24/7 odor complaint line, and continuous odor monitoring systems at the Tres Rios and Agua Nueva facilities.

### *Security*

As a result of the September 11, 2001, terrorist attacks on our nation, the Department of Homeland Security and Environmental Protection Agency developed recommendations and guidelines for water sector utilities to implement. Following these guidelines, RWRD developed a Security Master Plan for its entire wastewater system. The Master Plan provides security procedures and specifies state-of-the-art security systems and hardware for all critical facilities in the system. Security of RWRD's treatment facilities is continuously monitored by the SCADA system.

In addition to the high-tech security systems, the Security Master Plan is enhanced by the following practices:

- Use of the Incident Command System (ICS) during emergency responses.
- Coordination and Partnership with the Pima County Emergency Operations Center.
- Membership in the Arizona Water Agency Response Network (AZWARN). AZWARN is a formal mutual aid agreement whereby members call upon other member utilities for assistance at times of emergency.
- Development of a Continuity of Operations Plan (COOP). COOP originally was developed to maintain operations during a Pandemic Flu; it has since been expanded to handle all hazards.

### *Tres Rios WRF Energy Master Plan*

A detailed Tres Rios WRF Energy Master Plan was completed in 2010. The Plan reviewed the capacity of existing plant power sources, the condition of the onsite power infrastructure, and current and future power needs of the facility. To meet the new effluent quality requirements, the power consumption of the new wastewater treatment systems was forecast to be three to four times greater than the old facilities. During the development of the Energy Mater Plan, several energy options were considered to determine the most economical long-term power arrangement. To this end the following power sources were examined:

- A variety of commercial power rate structures;
- Use of an upgraded onsite co-generation facility; and
- Utilization of biogas as an energy source.

Through exploration of energy alternatives, it was determined that the multiple power feed sources to the plant (several sources from TEP, a new solar energy facility, and the onsite co-generation facility) were not integrated. It was also determined that the large portion of the plant's power infrastructure was beyond its useful life and needed to be replaced for future system reliability. The Co-generation Facility, while serving the plant for nearly 40 years, was inefficient and in need of significant upgrades and modernization to meet future power needs and current air quality standards.

*Installation of power substation*

Upon completion of the plan, recommendations included:

- Consolidation of all external power sources;
- Construction of two independent 46 kilovolt (kV) power feeds from TEP with 13.8 kV step-down transformers;
- Retirement of all old electrical systems, gear, and Powerhouse;
- Installation of a new 13.8 kilovolt power center and distribution system on the Tres Rios site; and
- Application for a new discounted power rate (LLP-14) from TEP.

The consolidation of the power sources enabled the Tres Rios WRF to obtain a very favorable power rate from TEP. With such a favorable commercial power rate, the upgrade and modernization of the cogeneration facility became infeasible, especially when expensive built-in redundancies and upgraded air pollution control equipment would be required, making such an upgrade economically unrealistic. In addition to the expense of upgrading and modernizing the existing cogeneration facility, such a facility could not provide all the energy needed to operate the Tres Rios WRF. RWRD still would have to purchase power from TEP, but not at the discounted rate provided to larger users.

With the implementation of the Energy Master Plan recommendations, RWRD upgraded the plant-wide power system; has the power redundancy mandated by ADEQ; and has achieved long-term power reliability at the least possible cost for an energy intensive operation.

### *Staffing*

Elements of the ROMP Program implementation required staff repositioning and reductions, the most significant of which was the phase-out of the Roger Road WRF after the facility was decommissioned. Foreseeing that various existing positions were to be impacted, RWRD management promised RWRD employees that no layoffs would occur as a result of the ROMP Program. Over the six years that the ROMP has been underway, the department has experienced a relatively high rate of attrition. This attrition is due largely to staff retirements along with other more typical causes such as employees' acceptance of other jobs, employee relocations, etc.

Under the award of the Design-Build-Operate (DBO) contract for the Agua Nueva WRF, the new facility will be operated by a private sector firm for the next 15 to 20 years. When the DBO procurement was approved by the Board of Supervisors, the private firm (CH2M Hill) was required to hire at least 75 percent of its non-managerial staff from the ranks of the existing RWRD employees. Staff who wished to make that move did so strictly on a volunteer basis. Further, the Board of Supervisors mandated that the DBO contractor offer a salary and benefits package equal to or better than the County's salary and benefits package. CH2M Hill was successful in attracting RWRD staff to fill the 75 percent staffing requirement. With the substantial completion of the ROMP Program, all staff adjustments have been made without any RWRD staff losing their job – **thus the promise made to RWRD employees was fulfilled**

***All staff adjustments have been made without any RWRD staff losing their job – thus the promise made to RWRD employees was fulfilled***

### *Sustainability*

In May 2007, the Pima County Board of Supervisors (BOS) adopted Resolution No. 2007-84 in support of County sustainability initiatives. In August 2008, Pima County published its first Five-year Sustainability Action Plan for County Operations. Within that Plan, numerous Sustainability Goals have a close relationship with the ROMP goals and has served as valuable guide to RWRD's decision making for the ROMP Program.

### *Water Conservation and Management*

Through the ROMP projects, RWRD will produce a much higher quality reclaimed water, an important renewable water resource for the Tucson Water reclaimed water system, Santa Cruz River ecosystem and for aquifer replenishment. Although the ROMP was developed to improve the quality of effluent discharges into the Santa Cruz River, the near-drinking water quality of the effluent we are producing allows for additional uses. In the past, lower-quality effluent was used primarily for turf irrigation. The cleaner water allows for additional uses such as fire suppression, toilet flushing and cooling towers. As potable water sources are strained by increasing populations and persistent drought conditions, these additional uses of reclaimed water will prove to be a great benefit to the

*Effluent discharge into Santa Cruz River*

community. The improved quality of our effluent also benefits the community's reclaimed water system operated by Tucson Water. In the past, leaks in the reclaimed water system had to be repaired immediately because human contact was not advised. The cleaner water also will promote groundwater recharge efforts, and will benefit other riparian habitats.

### Renewable Energy and Conservation

Few realize that biogas, a byproduct generated during wastewater sludge treatment, is a renewable energy source, which can be used in lieu of fossil fuel to reduce the nation's dependence on petroleum products. Biogas is composed primarily of methane ($CH_4$) and carbon dioxide ($CO_2$), two major greenhouse gases. When released directly into the atmosphere, they contribute to global warming and other air quality issues. In Pima County, anaerobic digestion (the process used to treat sludge) produces over 4,000 metric tons of $CH_4$ and over 7,000 metric tons of $CO_2$ each year.

With the closure of the cogeneration facility, RWRD has actively sought new opportunities to beneficially utilize biogas as a renewable energy source to prevent the release of biogas. On August 5, 2013, the Pima County Procurement Department publically solicited responses to a Request for Qualifications (RFQ) entitled "Biogas Utilization and Sale Project." On September 17, 2013 Statements of Qualifications from a number of firms were received. On February 4, 2014, the Pima County Board of Supervisors' approved a project to beneficially use the biogas. RWRD has now entered into negotiations with an entity to beneficially use the biogas produced at the Tres Rios WRF by the end of 2015. Since no sludge is processed at the Agua Nueva WRF, there is no biogas generated there.

### Solar Energy

In 2010 and 2011, two, one-megawatt, solar power projects were completed. One solar project is adjacent to Tres Rios WRF and the other is just north of the WESC and Agua Nueva WRF.

*Digester gas complex*

Electricity generated at these solar facilities is used to augment power for the wastewater treatment processes at the regional facilities.

### Carbon Footprint Reduction

While the methane gas generated at the Tres Rios WRF will be beneficially used by the end of 2015, at this point, RWRD is exploring options for the reuse of carbon dioxide. RWRD staff has made great progress in bringing together the University of Arizona, local community experts, multi-government stakeholders, authorities at the national level, and other interested parties to investigate reuse options for other biogas constituents, including carbon dioxide.

***The Water and Energy Sustainability Center was constructed with a reduced environmental footprint.***

### Green Building

Completed in December 2011, the Water and Energy Sustainability Center (WESC) consists of 40,000 square feet that houses a state-of-art laboratory, compliance and monitoring offices, and a training center. This facility was constructed with a reduced environmental footprint. It complies with LEED specifications. The site utilizes passive water harvesting during storm events to aid in plant irrigation. Landscape plantings were chosen based on low irrigation needs; however, reclaimed water is used when irrigation is needed.

*WESC lab interior*

The Agua Nueva WRF administration building also has a reduced carbon footprint and complies with LEED Silver requirements.

### Side-Stream Treatment

RWRD's "green" vision has led the department to investigate side stream treatment. Side-stream flows within the wastewater treatment process contain high concentrations of nutrients that are 30 – 40 times stronger than constituents in raw wastewater influent. Currently, side-stream flows are returned to the headworks where they are mixed with influent and are sent back through the wastewater treatment process. They increase the amount of energy needed to treat wastewater. However, side streams can be treated separately, and nutrient recovery from side stream treatment can result in the recovery of phosphate-rich nutrients. These nutrients can be turned into agricultural fertilizers. RWRD is pursuing a sustainable and cost effective way to manage and recover phosphate-rich nutrients from the side stream. Upon completion, this effort will reduce energy costs at the Tres Rios facility and will

result in a marketable, reusable product that will generate revenue for RWRD.

## REMAINING PROJECTS

There are a few projects that have not yet been completed. In addition, there are potential projects that may have to be undertaken based on operating performance of the plants after one to two years.

### *Total Trihalomethane Control*

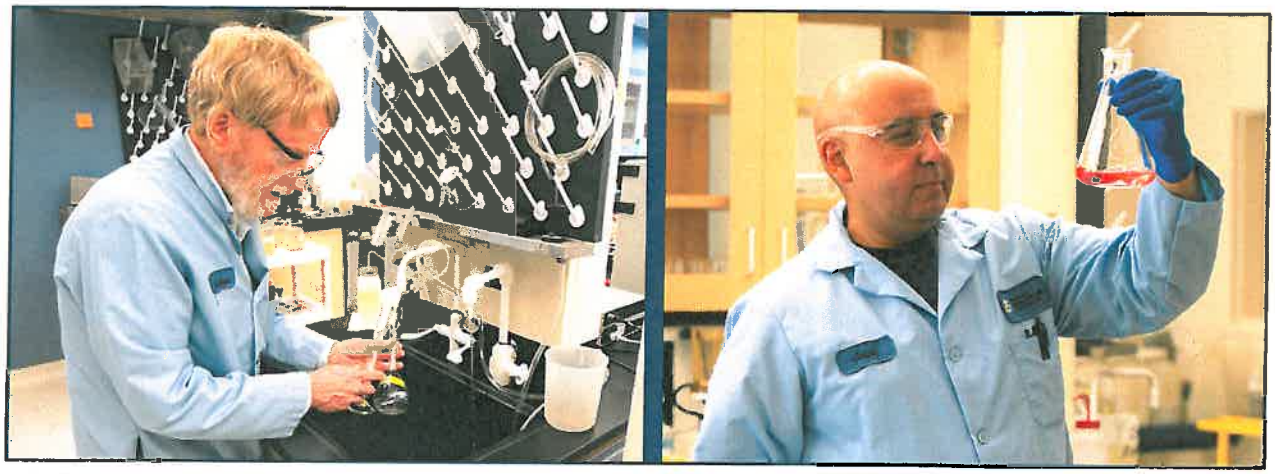
RWRD is exploring innovative ways to properly control total trihalomethanes (TTHM) in effluent discharges at the Tres Rios WRF. TTHM control is an ADEQ permit requirement. To mitigate the formation of TTHM, the department is studying the use of naturally-occurring ammonia that is present in the waste stream. Addition of ammonia in the disinfection process can control the formation of TTHM. Should these internal sources of ammonia prove to be uncontrollable or unreliable, a commercial aqueous ammonia system would have to be furnished and installed at a cost of over $1 million. After the installation of such a system, the department would have to purchase aqueous ammonia on an ongoing basis.

### *Renovations of Facilities Not Included in the Tres Rios WRF Upgrade*

A few old facilities (constructed in the 1970s) located on the Tres Rios WRF site have not been renovated, remodeled, or replaced as part of the massive upgrade program at the facility. Remodeling or rehabilitation of these untouched areas is essential for their future use. Work to rehabilitate these areas could not effectively begin until all of the other upgrade and expansion work was completed. The remaining infrastructure rehabilitation work is currently under assessment. The cost of these upgrades will be more than $10 million; completion of these projects is projected for the end of 2015.

### *Performance Model*

Any new system as complex as a modern wastewater treatment facility requires a period of performance to determine how the process reacts to certain conditions over the course of a year. Once the plant is operated in a variety of conditions (temperature, precipitation, fluctuation of flows etc.), "fine tuning" of energy, chemical supplies, materials and labor required for optimum performance can begin. However, to assist in process evaluations, calibrated and verified performance models will be used to reflect actual performance and process results. As the facility operates over a one to two



*Staff at work in new lab*

year period, system performance data is entered into the simulation model. Systems operations always begin at safe operating levels. However after enough data is incorporated into the model, adjustments that allow us to maintain permit compliance - while saving resources and money - can be made. Such adjustments can be made without ramifications to plant operations through trial and error modifications that could potentially result in permit violations.

Process optimization is particularly important in Pima County, because of the close link between the Agua Nueva WRF and Tres Rios WRF. Process optimization will allow the determination of the most economical operating arrangement between the two RWRD facilities with predictions of performance impacts from future wastewater flows and loads, and of new treatment technologies that may be under consideration. The process optimization activities typically continue for two years after new systems are placed into service at a cost of approximately $300,000.

## CONCLUSIONS

The ROMP Program was born out of the 2005 unfunded regulatory mandate to improve the quality of the effluent being discharged to the Santa Cruz River. The program evolved into a multi-goal master plan to comprehensively meet the various needs of the Pima County regional wastewater system for decades to come, including the mandates set forth by ADEQ. With the substantial involvement of impacted stakeholders, the community's wastewater infrastructure needs were identified, and RWRD began the work meet those needs. The ROMP Program became the largest public works project ever undertaken in the history of Pima County.

After nearly a decade of developing and implementing the Program, the major components have been substantially completed, including the introduction to the community of a modern wastewater treatment process that meets new stringent environmental standards. The successfully-completed components of the ROMP to date include:

- Replacement of the aged Roger Road WRF with the new Agua Nueva WRF,
- Expansion and rehabilitation of the Tres Rios WRF,
- Construction and operation of a 5-mile plant interconnect pipeline,
- Comprehensive system wide odor control systems and
- A new regulatory compliance laboratory and training center.

All of these facilities and others in the Program have been completed ahead of the regulatory mandated schedules.

A major accomplishment in the Program includes a reduction of more than $114 million in project costs from the original $720 million ROMP Budget. The cost to complete the ROMP Program is currently estimated to be under $606 million. This substantial savings is primarily attributed to the utilization of project delivery methods best suited for the individual ROMP projects coupled with the strong management of the various ROMP contracts by RWRD staff and the department's consultants. Conditions in the construction market also played a significant role in reducing project costs.

Although sewer user bills have risen significantly since the inception of the ROMP, the savings described above saved the community from even higher monthly bills. Even with the significant increases in sewer bills, today Pima County's wastewater rates are well within the mid-range of

the national average. This is largely due to the fact that at the beginning of this century sewer bills in Pima County were artificially low and could not maintain the needs of the aged infrastructure, much less the needs of a modern system.

In spite of the fact that Pima County now has sewer bills that are in line with the national average, both the department and the Board of Supervisors understood that the steep increase in bills became a hardship for many in our community. To ensure low-income residents were not harmed by the increases, the Board of Supervisors implemented a subsidy program for those who would have the most difficulty paying their bills.

The increased fees have been critical for the community's water resources. The improvements to the quality of our effluent will vastly improve the Santa Cruz River ecosystem and the quality of water replenishing the underlying aquifer. The high quality effluent we are producing is an important renewable water resource, especially for the City of Tucson's reclaimed water system. The improved quality of that effluent results in increased opportunities for reuse. Increased use of reclaimed water results in increased availability of potable water sources such as groundwater and Central Arizona Project (CAP) water. Although the overall ROMP Program is substantially complete, there remain a few projects to be accomplished:

*Santa Cruz River*

- The development of a cost effective way to control TTHMs, a regulated contaminant;
- The finalization of an agreement to beneficially utilize biogas with a revenue return to RWRD;
- The clean closure of the Roger Road WRF;
- Investigation of repurposing opportunities for the Roger Road property;
- Beneficial recovery of Struvite; and
- Close out of all the contracts in the ROMP Program.

Finally, RWRD wishes to acknowledge the strong support and cooperation from the Pima County Board of Supervisors, County Administration, Regional Wastewater Reclamation Advisory Committee, Consultants, Contractors, other Pima County departments and most importantly, RWRD employees who managed the various ROMP contracts and maintained operations within regulatory compliance.

Because of the collective dedication and hard work, the facilities constructed in the ROMP will serve the community for decades to come.

# APPENDIX – AWARD, RECOGNITIONS, ACCOLADES

The ROMP has received numerous awards and recognitions. There will likely be more acknowledgements of the outstanding work performed in the ROMP program. The chart below outlines the recognitions that have been granted to date.

| AWARD | AWARDING AGENCY | YEAR AWARDED | AWARD DESCRIPTION |
|---|---|---|---|
| Wastewater Project of the Year | AZ Water Association | 2008 | Recognizes outstanding, hard-working members of AZ Water. The vision is to promote a prestigious Awards Program that honors deserving members of AZ Water locally and nationally. |
| Engineering Excellence, Honor Award | American Council of Engineering Companies of Arizona | 2008 | Recognizes excellence in engineering and provides an opportunity for awardees to show-off an outstanding project for public exposure and marketing benefits at both the state and national levels. |
| Excellence in Environmental Engineering, Grand Prize – Planning | American Academy of Environmental Engineers | 2010 | Identifies rewards and promotes projects which typify quality in all facets of environmental engineering practice. |
| Operations and Engineering Performance Award | National Association of Clean Water Agencies | 2010 | Recognizes an innovative and effective project, system or method relating to wastewater treatment plant or collection system operations developed and successfully implemented in a cost-effective manner while achieving environmental compliance objectives. |
| RWRD was the recipient of three awards from APWA:<br><br>1. Southern Arizona Project of the Year<br><br>2. Southern Arizona Project of the Year | American Public Works Association | 2013 | Promotes excellence in the management and administration of public works projects by recognizing the alliance between the managing agency, the consultant/architect/ engineer, and the |

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| 3. Southern Arizona Project of the Year | | | contractor who, working together, complete public works projects. |
| Common Ground Award for Public Works Project of the Year | Metropolitan Pima Alliance | 2013 | Recognizes community leaders, projects and events with successful collaboration for the overall benefit of the community. |
| Top Project of the Year | Water & Wastes Digest | 2013 | Recognizes projects deemed most remarkable and innovative. Winners are selected based on the challenges they were faced with and the means by which they were overcome by all parties involved in the construction projects, as well as the goals and successes that were achieved |
| LEED Silver Certifications were awarded to the following structures:<br><br>1. Water and Energy Sustainability Center (WESC)<br><br>2. Agua Nueva, Administration Building | U.S. Green Building Council | 2013 | The LEED (Leadership in Energy and Environmental Design) program promotes more sustainable approaches to the way buildings are designed, constructed and operated. |