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More Capacity in Same Footprint —
Design and Construction of a 100 MGD Treatment Plant in Phoenix

BACKGROUND

City of Phoenix has a history of developing robust solutions whenever it is confronted with issues related to infrastructure management. One such opportunity presented itself a few years ago when the plant staff observed cracks developing in the concrete structures of the East Treatment train at the Deer Valley Water Treatment Plant (WTP). The City initiated extensive geotechnical investigation by a design team headed by Wilson Engineers. The geotechnical investigation revealed the presence of soft soil plume ranging from seven feet to twenty-five feet in depth below structures. Temporary measures were taken to stabilize the structures while a permanent solution was being investigated.

The Deer Valley WTP was built in the 1960s and with the promulgation of the Stage 2 Disinfection / Disinfection By-Products (D/DBP) Rule in 2012, the City settled on a long-term solution of demolishing the East Treatment train rated at 75 MGD production. In its place, a brand new facility rated at 100 MGD with the latest technologies capable of meeting current stringent drinking water requirements was designed and built.

The timeline coincided with the publication of the City’s Water Quality Master Plan (WQMP) Update, which indicated that the Deer Valley WTP needs to produce 100 MGD to meet system-wide demand. Treatment train options for the new East Basins at Deer Valley were also based on the recommendations from the WQMP Update. After intensive trimming of treatment process combinations, five options were carried out for detailed present worth analysis into the preliminary design stages of the project. All short-listed options included Pre-Sedimentation Basins (PSB), Rapid Mix Basins (RMB), and Sand Ballasted Flocculation (SBF) Basins. The main differences between the options were in filtration (Dual Media Filters with GAC Post Filter Contactors or GAC Filter Adsorbers) or in flow conveyance method (gravity flow vs pumped flow). The SBF process was chosen based on its reputation of being tolerant in the face of fluctuations in the source water quality. The treatment train that was finalized for the Deer Valley WTP – East Basins project included PSB, RMB, SBF Basins and GAC Filter Adsorbers (GAC FA) with source water pumped from the existing Raw Water Pump Station (RWPS). The detention time in the secondary treatment was significantly reduced from approximately three hours (conventional sedimentation process) to twenty minutes (SBF process) thereby reducing the plant footprint considerably. This enabled the City to increase the treatment capacity of the East Train from 75 MGD to 100 MGD in the same footprint.

TREATMENT TRAIN

Raw water is pumped from the RWPS to the PSBs. The PSBs consist of two trains of three clarifiers each with a detention time of approximately 50 minutes at a plant production of 100 MGD. Flow can be conveyed through the PSBs in a variety of configurations, namely parallel, series, bypass either one or both trains. Sludge blowdown from these will be routed through the vaults located north of the PSBs. Flow from the PSBs is conveyed to the Rapid Mix Basins (RMB) via a common inlet channel. Primary coagulant (ferric chloride) is fed at the RMBs. The water then flows through four separate pipes to the four SBF trains. Each SBF train has a treatment capacity of 28 MGD. A flow meter is located just upstream of each SBF train to monitor flow. Optimum dosage of polymer and
addition of sand to the flow stream in the SBF are critical to its performance. A common Tank Drain Pump Station is provided for draining the PSBs and the SBF Basins to facilitate dewatering during plant shutdown. An emergency bypass channel is provided at the SBF outlet to convey water from the SBF in case of any issues with SBF performance. Clarified water is conveyed via a common inlet channel to the Filter Adsorbers. There are two rows of nine GAC Filter Adsorbers (North and South Trains). Each filter is rated for 7.33 MGD capacity at 4.4 gpm / sf hydraulic loading rate. Fifteen filters are sufficient for a plant production of 100 MGD with three additional filters as standby (backwash mode or filter media changeout mode). The filtered water is collected in a common 66 inch header for each train and conveyed to the filtered water channel via a seal well with a weir. The GAC Facility also includes a GAC Fines Pump Station which will be used to convey virgin media backwash water to the head of the treatment train. An air scour system (blowers with air piping) is included in design for performing backwash with air.

ANCILLARY FACILITIES
Chlorine dioxide was chosen as the pre-oxidant and is generated onsite using a chlorine dioxide generation system housed in a building. Ancillary facility for this system includes Sodium Chlorite Storage Facility. Significant improvements to other existing facilities such as Backwash Pump Station (BWPS) were also required to accommodate the new treatment train. In addition, a second Wash Water Equalization Basin and a Pump Station were constructed as part of this project. This project also included the conversion of primary coagulant from Alum to Ferric Chloride. The Alum facility which used eductors for conveying chemical was replaced with a new Ferric Chloride feed facility with metering pumps. An additional caustic soda feed point with mechanical mixing was provided downstream of the reservoirs for improving pH control and reducing THM formation potential upstream of the distribution system. Sulfuric acid storage was also increased by fifty percent (7,000 gallons) to reduce frequency of chemical delivery.

CONTROL SYSTEM
One other key element of the project included the conversion of the SCADA system from Wonderware to User Configurable Operating System (UCOS). The UCOS conversion of the existing facilities was conducted in phases in order to minimize interruption to plant operations.

KEY CHALLENGES
One key challenge was the effort required for tie-ins of the new plant with existing facilities. This was accomplished with close coordination amongst all stakeholders in developing extensive Maintenance of Plant Operations (MOPOs) plans. Two major MOPOs involved plant shutdowns. The first MOPO included major modifications to the existing Backwash Pump Station (BWPS) header and installation of a temporary filter wash water line for existing West Basins that have been in operation during the entire duration of the East Basins Reconstruction project. This line is routed around the East Basins construction area and lasted for seven weeks from August 2008 to October 2008. The second MOPO included a new inlet box connection from the East Basins to the existing 84-inch raw water pipe, conversion of alum facility to ferrous chloride facility, addition of a secondary caustic feed point with induction mixer and baffles in the finished water tunnel upstream of the Finished Water Pump Station (FWPS) and conversion of the control system of some existing chemical facilities to UCOS. These were performed during a four month period between January 2010 and April 2010. Final connection to the filtered water tunnel from East Basins will be completed in late 2010 after performance testing.

A second challenge was the project schedule requiring the plant to be fully operational by early 2011. The project was divided into multiple packages to meet schedule and allow flexibility in budget allocation. The Notice to Proceed for the first package was issued in March 2008 and substantial completion scheduled for November 2010.

The City selected McCarthy Building Companies as the Construction Manager at Risk for this project. The City, Wilson Engineers and McCarthy worked in close coordination to keep the project on track to meet the City’s goals set for the project. The overall project cost is approximately $120 Million.
Dear Colleague,

I trust that this article finds you recovering and well rested after an enjoyable summer.

As for myself, I have begun to fulfill the vision passed on to me regarding the “Reign of Terror”. It began as I set out to develop an agenda for our Annual Summer Board Retreat and chose Friday, August 13th. No, I didn’t scare-off any of the Board Members that day, mostly because the retreat was held at the Westward Look Resort in Tucson where the Board Members could feel refreshed and relaxed about their roles and the staff comfortable and connected with the board.

For most of the year, when the Board meets, the time spent together is taken up with budgets, reports, crisis management and the day-to-day work of running the non-profit business. I have learned that board retreats can be a true gift to the organization if they are approached with the right mental attitude. By not terrorizing the Board, we were able to focus on the potential and possibilities of the organization by sharing innovative and creative ideas.

We got a lot done at the retreat and now have a lot of momentum going forward – plus we had some fun too. I would love to hear your thoughts on the retreat items discussed this year.

**LET US …**

- **Revisit our branding statements.** Who we are, what we do, what we represent, what our members can expect from us, and what resides in the hearts and the minds of those that come into contact with AZ Water. With the help of the Leadership Committee, AZ Water will continue to look at what we are committed to and how we will accomplish our branding statements.

- **Talk about and discuss what it is our membership wants and needs.** That’s where you fit in. We need your feedback and your suggestions so we as an association can continuously grow and improve. That’s not only a board function, it is an association function! You will receive an invitation to complete a short survey from AZ Water before the end of the year.

- **Improve continuity within the leadership roles of various committees** by a little restructuring and reassignments. I think we accomplished this by assigning the Membership committee and the Information Technology committee under the liaison duties of the Secretary. Other committees were reassigned as well.
AZ Water president’s report

continued from previous page

- **Think about new committees.** One idea is to develop a Contractors & Owners committee. This committee could harness the power of pulling contractors & owners together and working all towards the same goals; to better understand our industry; to improve our delivery of final products to our customers; and to develop lasting relationships. We can’t just say it, we need to do it, we need to live it, and we need to deliver it.

- **Offer volunteer opportunities for special assignments.** These opportunities would allow members who cannot participate in a committee (that usually requires a multi-year commitment) to volunteer for short-term tasks with a focused goal. A few examples might be; designing marketing materials, reviewing articles for publication in the Kachina News, on-the-spot membership interviews of/for projects or issues of interest, and research of pending legislature changes, new rules, and opinions. The list can become extensive, but it provides an opportunity for more members to take and play an active role in their AZ Water Association.

- **Begin budget planning early.** Let’s start talking budget in September versus December, helping us develop a better financial stance.

- **Shake up the annual conference.** Develop a program that will blend more interaction with the exhibitors, speakers, consultants, our colleagues, and association leadership.

Incredibly, we were able to talk about ALL of our ambitious agenda. I would like to thank the Board Members and staff for their continued leadership, ideas, and contributing to make the retreat successful. I look forward to keeping you informed as we proceed into the year.
THANK YOU FOR ELECTING ME AS YOUR AWWA DIRECTOR DURING THE AZ WATER

Director's Report

Looking ahead, one of the most critical issues facing AWWA and AZ Water is membership. I'd say it is an expected consequence of the times that sustaining our membership numbers is becoming increasingly difficult, and in fact both AWWA and AZ Water have seen membership decline. The benefits of both organizations are strong. We must make a focused effort and seek opportunities to encourage our colleagues to see the benefits regarding membership in AWWA and AZ Water that include making rehabilitation and replacement of aging infrastructure and security upgrades specifically eligible for loans. AWWA is in support of S. 1005. Other “hot” summer (and ongoing) topics in the AWWA focus included chemical security and state revolving fund reform and reauthorization. Regarding chemical security, AWWA supports approval of HR2868 without amendment. The bill would extend the current chemical security program for the chemical industry for three years and maintain the exclusion for the water sector. As you know, the water industry is subject to the Public Health Protection and Bioterrorism Prevention and Response Act of 2002, as well as several other standards and requirements. There may be attempts to amend the Homeland Security Committee bill to add provisions that give state or federal regulators the ultimate say over a utility’s choices of disinfectant. AWWA believes this choice must remain a local decision, so that the utility can balance all of the risks inherent in using any chemical with a plethora of local factors, including water chemistry, pathogens of concern, local infrastructures, and the physical infrastructure requirements associated with a change in disinfection. The second issue concerns reauthorization and reform of the State Revolving Funds for water and wastewater, including a significantly increased authorization of funding. The Senate Committee on Environment and Public Works has reported a bill (S. 1005) that increases drinking water SRF funding to $14.7 billion over the coming five years, and $20 billion for the wastewater SRF program. It also makes other reforms to streamline the SRF application process. S. 1005 bill would not only increase funding, but make some administrative improvements to the bill, including making rehabilitation and replacement of aging infrastructure and security upgrades specifically eligible for loans. AWWA is in support of S. 1005. Looking ahead, one of the most critical issues facing AWWA and AZ Water is membership. I’d say it is an expected consequence of the times that sustaining our membership numbers is becoming increasingly difficult, and in fact both AWWA and AZ Water have seen membership decline. The benefits of both organizations are strong. We must make a focused effort and seek opportunities to encourage our organizations and our colleagues to see the benefits regarding membership in AWWA and AZ Water that offer help towards increased effectiveness and efficiency through opportunities for training, networking and collaboration.

If you have any questions about AWWA please contact me. My contact information is listed on the AZ Water website.
AN ISSUE THAT IS BECOMING MORE PREVALENT IS RETIREMENT FROM THE PUBLIC sector utility work force. As municipalities struggle to balance their budgets, two things have been decreasing the number of workers in water. (For me this includes both water and wastewater workers). Initially there were retirement incentives. This made it very attractive for staff that had sufficient “points” to retire and many of them did just that. Secondly was the reduction in compensation to these workers.

As municipal budgets were restricted even further, incentives were no longer the only factor encouraging retirement. Salary increases were cut or eliminated. Benefits were reduced. Many municipalities needed furloughs (unpaid time off) to help balance budgets and to demonstrate to the public that staff was helping to keep services from being reduced even more drastically. These factors all led to an even higher rate of retirement. Most utilities have a very high percentage of workers already eligible to retire or that will be eligible in next five years. This retirement trend will continue.

It appears that the decrease in revenues to the municipalities may be bottoming out. Do not expect a quick increase in the economy. The experts are saying we are four years away from recovery. With lack of raises and continued furloughs for the next four years the municipal utility industry should expect high rates of retirements by the skilled senior staff.

The good news is there are smart ambitious people looking for work. The less good news is they need training. The best value in training in the water and wastewater area is provided by the AZ Water Association and our two parent organizations – the Water Environment Federation and the American Water Works Association.

The service provided by our workers in water is essential to the public health. The experience and skill level of our workers is dropping due to retirement. Municipal budgets have been cut because of the economy. To some, training has the appearance of being a luxury and would not be acceptable to the public. The workers in water are responsible for the maintenance of complex systems that are highly regulated. Small mistakes can put the public health at risk. Non compliance with water quality standards will erode public confidence. Training is a very effective way to raise staff skills to a higher level. This training does not have to be expensive. Many training opportunities are offered locally or a short inexpensive trip away.

Withholding training opportunities because of the “appearance to the public” is not a good business decision when the public health is at stake. Look for the least expensive options for training and take advantage. Most of these options are offered by the AZ Water Association and our hardworking skilled committee leaders and the members of our organization that volunteer their time because they are professionals. These training opportunities are being offered locally or in a location in Arizona that is not far away.

Our two parent organizations are responding to the need to replace our retiring workforce by implementing a new program. The Water Environment Federation and the American Water Works Association have joined forces on a public outreach campaign and web-based clearinghouse that enhances the image of water careers and exhorts students and job-seekers to “Work for Water.”

The “Work for Water” campaign promotes water careers as both professionally fulfilling and aligned to the greatest public health and environmental cause of our day. The outreach addresses one of the water community’s top concerns in the coming decade: the expected retirement of 30 percent of the water workforce and the need to recruit new talent to the industry. Visit the website at www.workforwater.org.

We as the leaders in our industry are responsible for the safety and quality of the water we provide to the public for drinking and for ensuring that the wastewater we treat for reuse or discharge does not impair the environment or create any issues for the people in our environment.
DURING MY YEARS AS A WATER ENVIRONMENT FEDERATION (WEF; ALEXANDRIA, VA) officer, I have traveled across North America and around the globe, meeting and talking with water professionals. Often, I am asked what these experiences have taught me. So, for my final highlights column, I thought I should share a few reflections.

I have found that water professionals are a special breed, no matter where you go. Our fellow professionals are dedicated to public service, protecting public health and the environment. They are inspired by the challenge of turning waste and pollution into valuable resources. Maybe that is why I have found water professionals to be the most open, friendly, and fun group of people. I especially have enjoyed and have been honored to travel as your president.

Note that I call us “water professionals,” not wastewater or drinking water professionals. There is only water. Efforts to compartmentalize its management into wastewater, water supply, or stormwater are misguided. Water is water no matter where it is found or how it is used. Effective management requires that we look at it holistically, as one resource to be protected and managed for human, ecologic, and economic benefit.

In addition, we as water professionals cannot view our role narrowly, focusing only on urban issues and still expecting to find sustainable solutions. Universally, agricultural uses dominate consumption, representing 70% to 80% of consumptive uses. Some of our biggest pollution problems, such as depleted oxygen in the Gulf of Mexico and Chesapeake Bay, as well as numerous dead zones at coastal sites and hypereutrophic lakes worldwide, are caused by agricultural runoff. As water professionals, if we are to truly be the stewards of the water environment, we cannot ignore agricultural impacts. We have to voice our ideas and take part in managing these problems.

But broadening our scope requires collaboration. We as a profession complain about the siloed nature of water regulation and management, yet as an industry, we often compartmentalize our activities. If we want to have a real impact on public policy and water management, we have to push ourselves to break down our artificial barriers and collaborate professionally to create one harmonized voice, one message for water.

In the United States, we have focused more on our differences than our commonalities. This has all too often prevented us from converting our message into public policy and action. I challenge all water professionals and association members to focus on our common vision and work hard to align the activities, messaging, and advocacy of our numerous associations.

I suggest that this collaboration needs to go beyond our traditional partners on a national and international level. Water is the integrating fabric in our world, important for drinking water, sanitation, energy, commerce, agriculture, and ecology. If we want to make a significant difference that creates a sustainable, high-quality water future, then we need diverse partners. This might include what some would at times call adversaries, such as environmental advocacy, industry, energy, and agricultural groups. In the end, we all seek high-quality sustainable water resources. So, our challenge is to find the common ground and leverage our ideas, resources, and constituencies to create a better water future globally.

Another paradigm that has to change is the idea that water is completely a local issue. Nothing is farther from the truth. As a profession, we have largely changed our thinking to seeing water in the context of watersheds and basins, but many do not appreciate the need to be engaged in the global issues and exchanges. Pollution issues affecting water are now global issues, from mercury deposition to climate change. Also, international trade of goods and products, especially food, is now as much controlled by the availability of water as by the availability of people, technology, and lands.

In North America, we have an obligation to share our ideas and technologies with the world, but we also can benefit from technologies and approaches in places all around the globe. I have seen remarkable advances in my travels from Europe to Israel and Singapore, and from China to Australia. We all benefit from not only the exchange of goods but also the exchange of ideas and technologies. WEF is committed to this global participation.

Water professionals are presented with a challenge this century as population growth and water demands skyrocket. Our approach to water management is outdated, from a time when water was generally abundant. The mentality was to use it and dispose of it, drain it, and sometimes treat it, but all with the goal to get water out of our fields and cities. Well, that was then and this is now.
CHARTING NEW WATERS: A Call To Action To Address U.S. Freshwater Challenges

WATER ENVIRONMENT FEDERATION JOINS NATIONAL EFFORT TO AVERT PENDING WATER CRISIS

ALEXANDRIA, Va. 9/15/10 – The Water Environment Federation (WEF) joined a diverse coalition of businesses, farmers, environmental not-for-profits and government agencies today in issuing a landmark call to action aimed at heading off a national crisis in water quality and supply that could affect the nation’s economy, the livability of our communities, and the health of our ecosystems.

“Charting New Waters: A Call to Action to Address U.S. Freshwater Challenges,” is the culmination of an intensive two-year collaboration exploring solutions to U.S. freshwater challenges. It was presented to the Obama Administration at a meeting of federal agencies convened by the White House Council on Environmental Quality (CEQ), and released to the public during a noon forum at the Ronald Reagan Building and International Trade Center.

The document is believed to be the first such comprehensive, cross-sector examination of U.S. freshwater challenges and solutions. It represents consensus recommendations of diverse interests convened by The Johnson Foundation at Wingspread, Wis.

“Freshwater is our most precious resource and the lifeblood of our economy – industry, agriculture and energy generation all depend heavily on adequate supplies of freshwater. Water quality in our natural and municipal freshwater systems is vital to the health and livability of our communities,” said Helen Johnson-Leipold, chairman of The Johnson Foundation at Wingspread. “The Foundation and its many partners in this collaboration offer the Call to Action as a means of bringing overdue attention to our nation’s freshwater challenges and sparking action to address them.”

The report identifies serious challenges to the quality and supply of freshwater, such as pollution and scarcity; competing urban, rural and ecosystem water needs; climate change; environmental and public health impacts; and a variety of economic implications. It offers actions to confront these threats and a plan to ensure that our freshwater resources are secure for the 21st century.

“With aging infrastructure, growing populations and climate change, water will become the defining societal and environmental challenge of the twenty-first century,” said WEF President Paul Freedman. “We need to rethink our twentieth century approaches to find sustainable solutions. The Freshwater Call to Action not only identifies key challenges but presents important recommendations that will move us towards these solutions.”

Among these recommendations is a range of management strategies across sectors, such as the streamlining and better coordination of fragmented governance among federal, state and local jurisdictions. Another key need identified in the report is modernizing our freshwater regulatory framework, developed in the 1970s to deal with the acute environmental issues of that era.

“For decades, U.S. water strategy has been cobbled together from diverse, incomplete, and sometimes conflicting policies. We can no longer afford to manage our water that way. The good news is that smart, effective, and innovative solutions to the nation’s water problems exist and can be implemented. That’s what this report recommends,” said Dr. Peter Gleick, President of the Pacific Institute, one of the nation’s leading water scientists and a co-signer of the report.

The report also calls for better accounting of the full cost of services delivered by municipal water and wastewater utilities and sharing this information with consumers. Revised pricing structures that more accurately reflect the full cost of services could be one step toward financing badly needed upgrades to U.S. water and wastewater systems.

In addition to signing onto the Call to Action, the parties in this groundbreaking initiative also made commitments as individual organizations to take actions to address freshwater challenges.

For additional information about the Call to Action, or to learn more about The Johnson Foundation at Wingspread, please visit www.johnsonfdn.org.
Facilitate Full Scale Chlorine Dioxide Demonstration Testing

City of Phoenix

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BRIEF HISTORY

Bench scale studies that were performed as part of the Water Quality Master Plan (WQMP) Updated indicated that Chlorine Dioxide at a dosage of 3.0 mg/l may assist in reduction of Total Trihalo-methanes (TTHM) in the distribution system. The Stage 2 Disinfection By-Product (DBP) Rule to be promulgated in 2012 requires the Locational Running Average Annual (LRAA) of TTHMs be less than the Maximum Contaminant Level (MCL) of 80 ug/l instead of a system wide average complying with the MCL. WQMP update recommended a full scale chlorine dioxide demonstration test to validate the bench scale study results.

The construction of the Deer Valley Water Treatment Plant (WTP) – East Basins Reconstruction project commenced in March 2008. The treatment train for the East Basins includes Pre-Sedimentation Basins (PSB), Rapid Mix Basins, Sand Ballasted Flocculation Basins and GAC Filter Adsorbers along with ancillary support facilities. Chlorine was replaced with Chlorine Dioxide (maximum dosage of 1 mg/l) as a pre-oxidant. Since the Deer Valley WTP was further along in design and construction of the Chlorine Dioxide Facilities, the City decided to perform the Chlorine Dioxide Demonstration Testing at Deer Valley WTP.

Chlorine Dioxide at a dosage of 3 mg/l is regulated by EPA with an MCL of 1 mg/l. The City’s common practice for all regulated parameters has been to provide treatment that targets a maximum of 80% of MCL. Theoretically, chlorine dioxide converts to chlorite ions at the rate of 70% per mg/l of chlorine dioxide. Ferrous chloride addition downstream of chlorine dioxide feed is dosed to reduce chlorite concentrations below MCLs. Since the original intent of the chlorine dioxide facilities at Deer Valley WTP was a maximum dosage of 1 mg/l, ferrous chloride storage and feed facilities were not included in the project. The City retained the services of Wilson Engineers and McCarthy Building Companies to design and construct facilities respectively and Malcolm Pirnie to sample and analyze data to determine effectiveness of Chlorine Dioxide at 3 mg/l in reducing system-wide TTHM formation.

CHALLENGES

The primary challenge for the design and construction of Temporary Ferrous Chloride Facility was the time frame available since it was more beneficial to the City to perform the testing in the summer months to maximize the benefit of using this technology. This meant adjusting the traditional method of design and construction by closely coordinating with the Contractor in releasing long lead equipment prior to the completion of design. Some of items released for early procurement included FRP storage tanks, metering pumps, flow meters, electrical transformers and control panels. An early package involving earthwork and site activities was also released to allow the Contractor get a head-start. Early and effective communication was established with the regulatory agencies (MCESD and COP – Annual Facilities Program) to educate them about the project and the time-sensitive nature of it. With team work from all stakeholders, the project was designed, permitted and constructed by July 31st, 2009 within a span of 10 weeks. Commissioning activities began on August 4th, 2009.

Another key challenge was the evaluation / installation of an online chlorite analyzer during construction of the project. The Chlorine Dioxide and Temporary Ferrous Chloride Facilities and chlorite monitoring was new to the plant staff. Hence, the City staff expressed the desire to have an in-line chlorite analyzer to augment their sample / bench top analysis and track the chlorite values across the treatment train from raw water to filtered water. During literature review for other treatment plants using chlorine dioxide facilities, it was apparent that most of the facilities (except two) were dosing less than 1.5 mg/l and therefore, did not have a need for in-line chlorite monitoring. The two facilities with chlorite analyzers (same vendor) installed were monitoring chlorite in the filtered water. Since the solids content in the sample is higher in water upstream of the filters, adjustments were made to the piping to optimize the number of flushes/ calibration required. Chlorite analyzers were procured and installed at three locations at Deer Valley WTP – one each at the following locations:

- Downstream of primary ferrous chloride feed – approximately at one third of the Pre-Sedimentation Basins
- Downstream of Rapid Mix Basins
- Downstream of the filters

DESIGN REQUIREMENTS

The City was able to keep a constant production rate of 50 Million Gallons per day (MGD) at Deer Valley WTP during the Chlorine Dioxide Demonstration Testing to limit the number of variables.

The chlorine dioxide generators selected for the Deer Valley WTP project uses sodium chlorite (bulk solution stored in new Sodium Chlorite Storage Facility), chlorine gas (from existing Chlorine Building) and water. The Chlorine Dioxide Building houses two 2000 pound per day (ppd) units. When chlorine dioxide is dosed at 3 mg/l at 50 MGD production, 1300 ppd of chemical is required which is well below the capacity.
of one generator. The design included two 7,500 gallon storage tanks for sodium chlorite. The Chlorine Dioxide Building and the Sodium Chlorite Storage Facility are strategically located north of the existing Chlorine Building for providing the necessary chlorine gas. Temporary Ferrous Facilities included two 8,000 gallon storage tanks, two metering pumps and associated piping accessories. This facility is located north of these facilities for ease of maintenance for the plant staff.

**CONTROL STRATEGY**

Chlorine dioxide feed point is located at the Raw Water Pump Station (RWPS) header. The primary ferrous chloride feed point is located just upstream of the West PSBs. The chlorite values are monitored by a chlorite analyzer located in the PSBs. A majority of ferrous chloride is fed at this location to reduce the chlorite to approximately 0.6 mg/L. A trim ferrous chloride feed point is located downstream of the PSBs near the rapid mixers. A second analyzer is located downstream of the rapid mixers to monitor the chlorite values. The second feed point is intended to capture the remainder of chlorite. A third chlorite analyzer is located downstream of the filters for monitoring purposes. Compliance samples for chlorite are collected at the Entry Point to Distribution System (EPDS) located near the Finished Water Pump Station (FWPS). A schematic with a summary of the feed / monitoring locations is shown in the figure below.

**SAMPLE COLLECTION / DATA ANALYSIS**

Malcolm Pirnie conducted tracer analysis to identify distribution system sampling locations for TTHM analysis during the construction period. Samples were collected from August 4th 2009 to January 8th, 2010 in a series of alternating chlorine dioxide on / off cycles. The key observation was the effectiveness of chlorine dioxide at 3 mg/L varied with the source water composition. The source water for Deer Valley WTP has a combination of water from Salt River and Verde River. Preliminary data review indicated better results of TTHM reduction (approximately 16 % to 35 %) when using chlorine dioxide with Salt River water. No quantifiable reduction was observed with Verde River water. The commencement of data collection at 3 mg/L started in early September with temperatures exhibiting a cooling trend. The recommendation from data analysis included further testing in the peak summer months (May to August) as well as additional corrosion testing. The second phase of the Chlorine Dioxide Demonstration Testing is currently ongoing for additional data collection.

**STARTUP / COMMISSIONING**

The startup / commissioning activities of the Chlorine Dioxide Facilities began on August 4th, 2009 at low dosages of chlorine dioxide. Due to modifications in controls and programming to incorporate multiple layers of alarms and interlocks and the validation of the chlorite analyzers with laboratory samples, the chlorine dioxide system was ramped up and operational by early September. Startup / commissioning activities are summarized in the figure below.
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E-mail: kflanagan@miscowater.com

AZ Water Association
Fall 2010
AZ Water
84th Annual Conference & Exhibition
CALL FOR ABSTRACTS
Abstracts Due: November 19, 2010
May 4-6, 2011
Renaissance Glendale Hotel & Spa, Glendale, Arizona

GENERAL INSTRUCTIONS
Individuals interested in presenting a paper at AZ Water’s 84th Annual Conference & Exhibition submit the following four documents by November 19, 2010:

1) Complete the Abstract Submittal Form
2) Provide a one page abstract describing the subject matter in sufficient detail to allow evaluation of the proposed topic.
3) Provide a short paragraph description of the session presentation not to exceed 125 words. This summary will be included in the conference marketing brochure.
4) Provide a short biography of the presenter, not to exceed 60 words. This summary will be read by the moderator before the presentation. Generally, presentations will be limited to 25-30 minutes including time for questions, however longer presentations will be considered.

SUGGESTED TOPICS

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<td>Security/Vulnerability</td>
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<td>Receiving Water Quality</td>
<td>TDS Issues and Brine Treatment</td>
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SELECTION CRITERIA
Abstracts will be reviewed and judged on the basis of the following criteria:
- Describes the paper in a clear and concise manner.
- Significance of the work to a broad audience.
- Originality of the work, including new concepts, innovations, or data.

ABSTRACT SUBMITTAL FORM (Fill out Form or Create Word Document)

TITLE OF PAPER: ________________________________

List Main Topic and Sub-topic (closest to suggested topics listed above) ________________________________

Corresponding Author (all correspondence will be with this author) ________________________________

Presenter? Yes ___ No ___

Name: ________________________________

Employer: ________________________________

Address: ________________________________

City, State, Zip: ________________________________ E-mail Address (required): ________________________________

Phone: ________________________________ Fax: ________________________________

Check here if interested in receiving more information about the Young Professionals “Fresh Ideas” contest for accepted papers

SUBMIT THE FOUR DOCUMENTS TO:

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<td>Option 3: Mail Hardcopy to: Attention to: Tim Thomure, PMP HDR Engineering, Inc. 5210 E. Williams Circle, Ste. 530 Tucson, AZ 85711-4459 Phone: 520-584-3640 FAX: 520-584-3624</td>
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AZ Water Association
TAP INTO QUALITY

The Tap Into Quality Committee has just finished a complete update to the website tapintquality.com. In addition to behind the scenes code updates, which make the site more up-to-date and user friendly, the entire site was converted to Spanish. Similar to water utilities providing the annual Consumer Confidence Report (CCR) or Water Quality Report in English and Spanish, Tap Into Quality recognized the importance of reaching out and spreading the message that tap water is Safe, Affordable and Convenient to the many Spanish speakers in the area. See the new site at http://tapintoquality.com/home.html.

New Members

Tap Into Quality would like to welcome its newest participants Ray Pulver and Joe Garza from City of Surprise; and, Maria Hinojos and Barbara Chappell from City of Avondale. We look forward to working with you on the committee!

Events

Tap Into Quality continues to distribute its award winning CD ROMs to educators in Arizona. The CD was developed in 2005 by the TIQ committee to expand and extend the 6th grade science curriculum in the study of water, and supplement the 8th grade chemistry study. The CD contains information that can be useful to any grade level, K through HS. Water (4th grade) and Chemistry (5th grade) activities can easily be adapted from these middle school lessons, or used (as is) to challenge eager learners! Topics featured on the CD include:

- Water Sources and the Water Cycle
- Arizona’s history regarding water for the last 1000 years
- Water Treatment Process and Testing
- Extensive Glossary
- Classroom activities designed and correlated to the 2004 Arizona State Science Standards.

Most recently, over 3,300 CDs were provided to the following educators:

- Educators attending for the APS Back to School Resource Fair and Reception at the Arizona Science Center in September.
- Educators participating in Valley Forward’s EarthFest Educators Night at the Phoenix Zoo

Tap Into Quality meetings occur every other month, usually the last Tuesday of the month. The next scheduled meeting is November 30th. Meetings are held in Tempe at 6600 S. Price Road in the City of Tempe Environmental Services Bldg. A Conference Room, 10:30AM -12:00PM. Please email christina_hoppes@tempe.gov for more information about Tap Into Quality.

AZWARN / SECURITY

The Arizona Water and Wastewater Agency Response Network (AZWARN) continues to hold steady at 17 member utilities. Although a small number compared to the total number of water and wastewater utilities in the state of Arizona; almost 80 percent of the state’s population is part of AZWARN. Modification to the agreement and other alternatives are being looked at to increase membership and participation in AZWARN.

Over the past several months the group has been diligently working to complete the AZWARN Operational Plan and updates to the AZWARN website www.azwarn.org by October. The Operational Plan provides additional framework for AZWARN and assists member utilities in the process for mutual aid request and response. Adoption of the Operational Plan is anticipated for mid October.

The website upgrades provide a number of enhancements to the member side of the website, to further assist in mutual aid request and response. Some of the upgrades include better prioritization of emergency requests, enhancements to resource lists and contacts, location mapping, document storage, and bulletin notifications.

Water and Wastewater utilities interested in learning more about AZWARN should contact Steve Shepard, AZWARN Chair, at info@azwarn.org.

YOUNG PROFESSIONALS

Thank You For Your Continued Support

Young Professionals have had a busy year once again. From student outreach at universities and volunteering as judges for national competitions, to technical lunch seminars and social outings; the Young Professionals Committee strives to provide a lineup of events that all water professionals benefit from. Despite challenging economic times, the YP Committee has remained committed to providing support and outreach opportunities to all young professionals across our industry. Without the continued support of AZ Water members,
the successes of the YP Committee would not be possible. Thank you AZ Water members!

AZ Water Annual Conference, BBQ Raffle, and Fresh Ideas Contest

YP Block: Recession-Proof Yourself and Your Career

The Young Professionals Committee would like to thank the participants and attendees at this year’s YP session conducted at the AZ Water Annual Conference. Ms. Manika Gupta of CH2MILL, Ms. Nancy Reynolds of Lee Hecht Harrison, and Mr. David Feiler of North Star Financial enlightened the audience with presentations about promoting yourself in your current position, marketing yourself for a future position, and managing your personal finances. Approximately 40 attendees of all ages and backgrounds attended the session. Thanks again to our wonderful speakers!

Conference BBQ YP Raffle

The YP Committee would like to thank all the volunteers, participants, and sponsors that made this year’s Annual Conference BBQ Raffle a tremendous success! The YP Committee appreciates the continued support from the entire membership of AZ Water. Our Committee remains successful due to events like these. A special thank you goes out to this year’s raffle sponsors: AZ Water, Black & Veatch, Carollo, GHD, Greeley & Hansen, Kiewit, Malcolm Pirnie, MGC Contractors, Stantec, and Sundt.

Young Professional of the Year

Patrick Goodfellow of CDM, another outstanding AZ Water Young Professional was recognized as the 2010 Young Professional of the Year. Patrick is a can-do volunteer that has provided guidance, leadership, and volunteers wherever he is needed. He is an exceptional Young Professional. Congratulations again Patrick!

Fresh Ideas

The Fresh Ideas Contest provides an opportunity for a young professional to showcase their work on a national level. This year, Sarah Gurule of Wilson Engineers gave an outstanding presentation at the AZ Water Annual Conference and was selected to represent Arizona with a poster at the 2010 AWWA Annual Conference and Exposition in Chicago. Her poster, When Good Instrumentation Goes Bad: The Town of Sahuarita WWTP 1.5 MGD Expansion Start-Up Experience, landed a prime spot on the poster exhibit floor and was well-received. Congratulations Sarah!

Bowl-A-Thon

Thank you to everyone who made it out for the seventh annual Bowl-A-Thon. It was a striking success! Over fifty bowlers of all ages enjoyed an afternoon of pizza, candy, raffle prizes, strikes, spares, and gutter balls. The YP Committee would like to thank our sponsors: American Ductile Iron Pipe, AZ Water, Carollo, CDM, Coombs-Hopkins, Greeley & Hansen, HDR, Malcolm Pirnie, Stantec, and Sundt.

Technical Lunch Series

The YP Committee hosted summer Technical Lunch Series themed What Utilities are Up Against – How Do Projects Get Funded? Over the course of four lectures, YPs learned from a consulting, city, and state-perspective about the challenges our industry is facing. The YP Committee extends its greatest thanks to our speakers: Melanie Ford and Veronica Rivera of the Water Infrastructure Finance Authority of Arizona (WIFA), Patricia Walker of Red Oak Consulting, Kathryn Sorensen of the City of Mesa, and Roger Bailey of the City of Glendale. The YP Committee would also like to thank CDM, DSWA, and Stantec for sponsoring the lunches.

Salt River Rafting

Young Professionals took a break from the heat and floated down the Salt River on July 31st.

Upcoming Events

On November 12th the YP Committee will be hosting a kickball game. Friends and family are welcome to join as we take on AzASCE YMF for kickball bragging rights.

Pedal With Purpose

Pedal With Purpose! enters its forth year. Water For People is an official beneficiary of El Tour, the Tucson perimeter ride held each year on the Saturday before Thanksgiving. For more info and to participate, visit www.pedalwithpurpose.org.
The Young Professionals Committee Congratulates This Year’s Fresh Ideas Winner!

SARAH GURULE, WILSON ENGINEERS

“Thanks to the Fresh Ideas Contest I was able to attend my first national conference. Presenting a poster at the AWWA ACE10 Conference in Chicago was a challenging and exciting experience. The poster session gave me the opportunity to share my topic with students and professionals from all over the country as well as meet the other poster presenters and network at the young professional banquet dinner. I have been able to increase my public speaking skills, build up my resume, network with young professionals from across the country and become more involved with Arizona’s Young Professional’s committee! The food, people, and beautiful architecture make Chicago an amazing city to visit. I feel very fortunate to have been able attend such a prestigious conference in such a unique city.”

-Sarah Gurule, Wilson Engineers

The Young Professionals Contest Will Return to Arizona in 2011!

One Lucky Young Professional Will Receive a FREE Trip to the 2011 AWWA Annual Conference & Exposition in Washington D.C.

To Participate, Simply Submit an Abstract for the 2011 AZ Water Annual Conference and Indicate Your Interest on the Submittal Form.

Young Professionals are under 35 years old, or have less than 10 years of experience.

If you have questions about this contest, are interested in participating, or would like to act as a judge, Please contact Gretchen Hawkins (gahawkin@asu.edu).
LOCATIONS & DATES:

**Flagstaff area** November 3, 2010
Flagstaff City Hall

**Phoenix area** November 23, 2010
Metro Water District

**Tucson area** December 8, 2010

COST: $60.00 per Person (Lunch Provided)

Questions? Call John Kmiec at (520) 837-2433

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AZ Water Association – Water Reuse Committee in association with WateReuse Arizona

**Water Reuse 101**

Presentations will address:

► ARIZONA WATER RESOURCES UPDATE  ► PLANNING FOR REUSE
► TREATMENT OPTIONS  ► ONGOING RESEARCH  ► PROGRAM HIGHLIGHTS
► END-USERS RESPONSIBILITIES and CROSS CONNECTION CONTROL
► PUBLIC PERCEPTION

Space is Limited! Registration begins October 1, 2010

THREE REGISTRATION OPTIONS

ONLINE REGISTRATION AT: www.azwater.org

EMAIL REGISTRATION FORM TO: John.Kmiec@tucsonaz.gov

MAIL REGISTRATION FORM TO:
John Kmiec, City of Tucson Water Department
4401 S. Tucson Estates Parkway, Tucson, AZ 85735

Method of Payment Accepted: Master Card, VISA or AMEX - Check - Money Order  
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I/we will attend the AZ WATER seminar in __________________________ Payment of $__________ is enclosed.
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Supporting the Current of Change in the Desert

14th Annual AZ Water | Water For People Golf Tournament

On June 12 2010, the hottest golf tournament in Arizona was held at a new venue, the prestigious Troon North Golf Club in Scottsdale. The golfers teed off at the “New” Pinnacle course, rated #1 in Arizona and #21 in the nation by the Golf Magazine, in absolutely fantastic weather.

The 88 registered golfers thoroughly enjoyed the break in the Arizona summer heat as temperatures remained below 80 degrees and their golf scores showed this. The Stantec team of Peter Parr, Roger Olsen, Brian Harmick and Michael Hunt won 1st place with a score of 59. SRP’s threesome of Bruce Hallin, Adam Hallin and Tom Buschatzke put together a fantastic round in spite of being one man down and took the 2nd place. The team from Splinter Creative comprising of Blair Hatfield, Brandon Cook, Norm LeBlanc and Blake Malooly took the 3rd place.

A new attraction to this year's tournament was the Par – 3 Challenge sponsored by Dixon Golf, a valley based 100 % recycled golf ball manufacturing company. The challenge was a huge success, with many golfers completing the challenge and winning a dozen golf balls.

Though there were many winners at the golf tournament, the real winner was Water For People and the people it helps in its program countries. We would like to thanks all our sponsors, golfers and door prize donors for making this possible! We hope that your support will continue to grow in years to come.

The adjoining page shows a few pictures from this memorable event. All the pictures from the golf tournament can be viewed and downloaded for free. Go to http://picasaweb.google.com/AZWaterForPeople/14thAnnualAZWaterForPeopleGolfTournament.

The AZ Water | Water For People committee would like give a special thanks to our volunteers who worked tirelessly before, during and after the tournament. Thank you!

Jared Carr Charles Ritter
Dave Christiana Brent Pennington
Sally Ceccarrelli-Wolf Eric Loring
Levi Dillon Venkat Radhakrishnan

Please save the date - June 25, 2011- for the 15th Annual AZ Water | Water For People Golf Tournament. For more info visit our committee page at http://azwater.org/Committees/WaterForPeople/pages/Default.aspx

Contact Levi Dillon, Chair at ldillon@carollo.com or Venkat Radhakrishnan, Vice-chair at vradhakrishnan@pirnie.com.
14th Annual AZ Water | Water For People Golf Tournament
ASA Analytics Welcomes Misco Tempe our New Arizona Representative

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- **Cogent Environmental** online analyzers for continuous monitoring of heavy metals

Contact Katie Flanagan, Dave Redman or Dennis Emrie to discuss your application or existing system.

Misco Tempe
1820 W. Drake Drive, Suite 105
Tempe, AZ 85283
480-940-6923
480-940-6935 FAX
Don’t Forget! It is that time again to identify fellow Arizona water/wastewater professionals and worthy projects for recognition at the 2011 AZ Water Association Annual Conference & Exhibition. Nominations due by March 25, 2011!

Award criteria, nomination forms, and points of contact for the 2010 AZ Water Awards Program can now be found ONLY online at www.azwater.org under the “Awards” committee page. Electronic applications will be accepted on the website starting January 1, 2011.

Questions can be directed to the Awards Program Committee Chair, Darlene Helm at (602) 534-9138 or the Board Liaison, Teresa Smith-DeHesus at (602) 381-4226.

Don’t Miss the March 25, 2011 Deadline!!
HOW WELL DO YOU KNOW YOUR DISTRIBUTION SYSTEM?

As cities get older so do their water distribution systems. The public and private water providers are challenged to distribute a quality product while reducing operating costs and meeting the new demands of the Safe Drinking Water Act along with other regulations. A majority of this effort in recent years has been devoted to the improvement of water treatment plants. The water distribution infrastructure has virtually gone unnoticed since it is buried beneath the surface. Usually, the only time in which the water distribution system gets noticed is when its rupture causes some amount of damage. Because of this and the lack of consistent maintenance programs, water providers find themselves in a difficult position of trying to decide what gets attention and what can wait to be repaired and/or replaced.

In a report released on April 12, 2000 by the Water Infrastructure Network entitled “Clean and Safe Water for the 21st Century”, it was stated that the water and wastewater system providers are challenged by the need to find funding to identify and improve the decaying portions of their systems.

It is the responsibility of the water provider to know the condition of their distribution infrastructure. When assessing a system a water provider has to know the following:

1. The location and size of water distribution pipe
2. What the pipe material is
3. The condition of the pipe both externally and internally
4. The condition and location of the fire hydrants in the system
5. The condition and location of the valves in the system
6. The condition of storage facilities and other crucial components

THE LOCATION AND SIZE OF WATER DISTRIBUTION PIPE

As communities grow the demands on the existing systems increase. Streets are being paved in new development areas with consideration being given to the size and location of these mains. During the planning and design phases it is increasingly more important to evaluate the area being supplied from the standpoint of how much water can be projected to guarantee that there will be no loss of revenues or low pressure problems.

A number of the new communities are being designed with various aesthetics like grassy medians or concrete surfaces on the roadways. Some of the communities already developed are in historic portions of cities. Both of these situations make it very difficult to perform conventional repairs on mains in those areas. This is even more complicated by the outrages of the communities affected as well as environmental groups and historical societies.

Global Positioning and GIS have been employed by a number of water providers to chart the location of their distribution systems for their records. Surprisingly, there are some agencies that have pipe, blow-offs, hydrants, and/or valves in uncharted or unmapped locations. This makes any maintenance and operation of these lost assets difficult at best. In this kind of situation a provider may even have water losses that cannot be identified because the location of the infrastructure is not known.

Another critical aspect of a pipeline’s ultimate performance is the soil material it is buried in. If the soil is corrosive it will present a problem that has to be dealt with. It will also influence the type of pipe material that can be placed in that environment, and be expected to perform to its potential.

THE PIPE MATERIAL

After the use of wood staves for transmission and distribution piping was ultimately eliminated Cast Iron was the dominant material used for water pipe. A lot of this pipe installed between fifty and one hundred years ago needs to be evaluated for its soundness and its ability to deliver the projected flows. Over the past forty or so years the use of Concrete, Ductile Iron, PVC and Steel have been the materials of choice. All of these materials have been affected directly or indirectly by corrosion.

An evaluation of the pipe material is a very essential part in a water provider’s determination of their infrastructure needs. There are a number of new technologies that assist in this process by allowing you to survey, view, or test miles of pipe with few excavations, but there is no substitute for the conventional method of exposing the pipe and making a physical examination where practical.

THE CONDITION OF THE PIPE

An evaluation of the pipe will provide samples that reflect the location and type of corrosion on the pipe. As a result of the lack of effective quality control measures some of the earlier Cast Iron pipe manufactured was cast with irregular wall thicknesses. This allowed external corrosion in some areas to take place over a shorter period of time with greater damage.

The buildup of material on the inside of the pipe as well as the corrosion on the outside has a devastating effect on its ability to deliver a quality product.

The evaluation of the pipe will determine whether it should be rehabilitated or replaced. This is a very important part of knowing the distribution system. As systems age it becomes apparent that some of the pipe ultimately have to be replaced, but with what, and what size?
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how well do you know your distribution system?

Though PVC is resistant to corrosion it is affected by the ability of chemicals and ground water in the soil around the pipe to leach into the distribution system. Higher than normal operating temperatures have a greater effect on PVC than other pipe materials.

There are lining processes and even different pipe materials that exist today that are not hindered by the process of corrosion as have been seen in the past, but these materials have to be viewed in light of what already exists. A good delivery system almost guarantees the quality of the product provided it leaves the treatment plant that way.

THE CONDITION AND LOCATION OF FIRE HYDRANTS AND BLOW-OFFS

A well maintained fire hydrant serves multiple purposes. While it is used to fight fires that threaten the safety of our homes and businesses, it is also used to aid in maintaining the quality of the water we drink. An effective flushing program utilizing fire hydrants and blow-offs are important parts of preventing the buildup of material on the inside of the pipe wall, as well as reducing the amount of stagnant water that accumulates at dead ends in the system. A well-greased and maintained fire hydrant will usually perform when called upon.

The location of fire hydrants and blow-offs are essential as well. When fighting fires local departments prefer access to hydrants a length not greater than approximately five hundred feet. During the design and layout of a distribution system, a hydrant’s and blow-off’s location play an important role in being able to move volumes of water through the system.

THE CONDITION AND LOCATION OF VALVES

There are several kinds of valves necessary for the proper operation of a distribution system. Butterfly, cone, gate, and pressure reducing valves all serve essential roles in a system. The proper maintenance and operation of valves guarantee system isolations (shutdowns) when and where needed. This reduces the number of customers inconvenienced in the event of a main break or other distribution problems. It also reduces the amount of water wasted when the main has to be drained.

During paving and street restorations valves are often lost under asphalt and concrete. These valves, though in the system, become a liability because they are not accessible. This prevents their maintenance, operation, and use when needed.

STORAGE FACILITIES

Storage facilities are often not noticed until there is a problem. Their purpose in the distribution system consists of the following:

- To provide large quantities of water for fire protection
- To balance the difference between supply and demand fluctuations
- To provide a place to handle the possibility of surges in the system
- To provide assistance in maintaining or establishing an efficient system
- To be used to implement the mixing of water from more than one source
- To provide an additional insertion point for chlorine in the system

It is critical to the effective operation of any distribution system to regularly evaluate storage facilities. An annual inspection generally reviewing facility components, the grounds surrounding it, the fence, doors, hatches, etc should be performed. A more detailed inspection evaluating the structure, pump data, energy consumption, along with any other associated components should be done in a manner consistent with regulatory requirements and the organization’s goals.

OTHER AREAS OF CONCERN

Water Quality

Water Quality sampling is an area of a distribution system that has generated more interest lately. Sampling is a requirement of local, state, and national regulatory agencies. It is also a means of checks and balances when reporting to the customer that the quality of the water is within the requirements specified by the governing authorities. This can be a valuable defensive tool for a water provider in the unfortunate event of a lawsuit against an agency centered on the quality of the product they provide.

Leak Detection

Leak Detection programs have done a great deal for water providers. Those providers that keep track of the difference between treated water sent from plants into their infrastructure and the amount they receive billable receipts for are able to identify some of the losses. On average these systems experience unaccounted for losses within the range of 5-25% of their treated water depending upon how aggressive they have been in their desire to keep this figure down. A portion of these losses are a result of water theft, but more of it is because of undetected leaks within the system that have not surfaced or as mentioned above it is loss in the section of the infrastructure whose location has not been identified. A good leak detection program not only aids in the identification of water losses, it is also a good component of maintaining a system providing a quality product.
Meters
Meters that have been in the system a long time may often under-register resulting in the loss of revenues to the water provider. A program to check the effectiveness of meters and to calibrate them can decrease the total amount of water a system does not receive funds for. It is a good business practice to generally know the effectiveness of the various sizes of meters in a distribution system.

A meter replacement program provides value to an agency as well. It is often more cost-effective to replace smaller size meters than to evaluate, calibrate, and repair them. Some water providers have established programs to replace their residential meters on a pre-determined frequency. Similar efforts are done with the larger ones also but requires more coordination and planning.

Cross Connection Control
There have been studies performed that validate the problems experienced when a water provider is not mindful of the various locations where contaminants can be introduced into the potable water system. Residences, commercial, and industrial facilities all need to be monitored to prevent the possibility of chemicals, chemical by-products, and/or waste materials from being introduced into the drinking water. Cross connection control is a valuable tool in reducing and even eliminating the prospect of an inadvertent spill being allowed to contaminate the treated water.

Long Range Planning
Long range planning on the part of a water provider allows them to forecast the anticipated needs of their system. Modeling to evaluate the existing effectiveness of water distribution also helps when establishing goals. There are a number of computer programs available to agencies to assist them in this process. The determination of future water needs can be accomplished during this process. More than one would imagine some water providers are finding out that at the current rate of growth of their communities they may not be able to supply their customers at a point in time in their future. A long range planning effort allows them to identify additional water sources, treatment options, and distribution infrastructure installations to prepare for their future.

Rehabilitation/Replacement
The decision to rehabilitate or replace can be better determined when a water provider has as much knowledge of their existing system that is readily available or accessible.

Five, ten, and twenty-year capital improvement programs are better financed when there is more information on the system. The determination of future goals for providing water service for commercial and domestic customers is enhanced by this information as well. In recent years, the number of rehabilitation options an agency has to choose from has increased. The quality of this effort has improved greatly over the years as well. A water provider has the ability to consider a wide range of alternatives to more accurately fulfill the need to enhance their infrastructure.

Customer Input
Customer concerns and complaints should be documented and used to determine problem areas in the system. Some of the leaks and problems found are a result of a call from a concerned customer. They usually identify low-pressure areas and water quality problems apart from those identified by the agency itself.

Accurate Records
One of the most important responsibilities of the water provider is to keep accurate records. Listed below are some of the critical areas or items records should be kept on:

- The location of components
- The maintenance records of existing infrastructure
- The effectiveness of distribution system components
- Water quality issues and the responses
- Replacement records and as-built drawings, etc.

CONCLUSION
A water provider has the responsibility of knowing their distribution system so that they may be able maintain the provision of a quality product to their customers. This entails knowing where the pipe is, what it is made of and its condition, where the blow-offs, fire hydrants, valves are as well as their condition. This means having effective meter calibration, maintenance, or replacement done and being aware of the condition of the facilities that store the water. Scheduling regular inspections and maintenance of reservoirs and storage tanks to make sure they are in a condition to meet their design intent is an essential component of a good infrastructure. A system is enhanced by the operation of effective flushing and leak detection programs. All of this should be done while keeping the customer informed and valuing their input.

In the absence of the operation of these programs a water provider will experience a reduction in or the loss of the provision of a quality product, which will ultimately translate into the loss of revenue and even increased repair/replacement costs. A good distribution infrastructure allows a water provider to maximize the revenue available while keeping down the cost to maintain and operate.
WATER TREATMENT GRADES 1 & 2
1. What processes remove Turbidity?
   A. Oxidation and disinfection
   B. Coagulation and Flocculation
   C. Ion Exchange and Softening
   D. Sedimentation and Filtration

2. How many cubic feet is contained in a basin that measures 125 feet long, 60 feet wide, and is 12 feet deep?
   A. 90,000 Cubic Feet
   B. 202,550 Gallons
   C. 750,000 Gallons
   D. 1,515,000 Gallons

3. What is the educational requirement for renewal of certification in Arizona?
   A. 10 CEU’s from an accredited college or university in Arizona each year.
   B. Attendance at 2 Tri-state Seminars within 5 years.
   C. Attendance at 1 Annual AZ Water Conference within 3 years.
   D. 30 PDH’s approved by ADEQ within 3 years.

4. If a chemical has a specific gravity of 1.33 and active ingredient purity of 48%, how many pounds of the active ingredient are in each gallon of the chemical?
   A. 1.33 Lbs/gal
   B. 5.32 Lbs/gal
   C. 8.34 Lbs/gal
   D. 11.1 Lbs/gal

5. What is the detention time in a filter that measures 25 feet long, 25 feet wide, and 16 feet deep if the flow through the filter is 4.5 million gallons per day (MGD)?
   A. 3.6 Minutes
   B. 6.0 Minutes
   C. 23.9 Minutes
   D. 68.0 Minutes

WATER TREATMENT GRADES 3 AND 4
1. What is the chlorine demand in a water treatment plant treating 48 million gallons per day (MGD) when 1300 lbs of chlorine are added each day and the residual is 0.75 mg/L?
   A. 1.08 MGD
   B. 1.80 MGD
   C. 3.70 MGD
   D. 6.25 MGD

2. How many cubic feet (CF) in a reservoir 55 feet in diameter and 26 feet deep?
   A. 61740 CF
   B. 71700 CF
   C. 84147 CF
   D. 92333 CF

3. What is the maximum chlorine residual allowed in the distribution system?
   A. Zero
   B. 0.2 mg/L
   C. 1.0 mg/L
   D. 4.0 mg/L

4. What is the most popular type of service meter for new residential homes?
   A. Compound
   B. Turbine
   C. Ultrasonic
   D. Nutating Disk

5. If a pressure gauge on a hydrant reads 85 psi, how many feet of head is that?
   A. 37 Feet
   B. 85 Feet
   C. 146 Feet
   D. 196 Feet

WATER DISTRIBUTION GRADES 1 & 2
1. A well produces 750 gallons per minute. How many Million Gallons per Day (MGD) is this?
   A. 1.08 MGD
   B. 1.50 MGD
   C. 2.50 MGD
   D. 3.20 MGD

2. How many cubic feet (CF) in a reservoir 55 feet in diameter and 26 feet deep?
   A. 61740 CF
   B. 71700 CF
   C. 84147 CF
   D. 92333 CF

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   A. 37 Feet
   B. 85 Feet
   C. 146 Feet
   D. 196 Feet

WATER DISTRIBUTION GRADES 3 & 4
1. A well produces 850 gallons per minute. How many acre-feet (AF) per year can it possibly produce?
   A. 100.7 AF
   B. 850 AF
   C. 1370 AF
   D. 2225 AF

2. What action may be required if the action level for lead is exceeded in the Lead and Copper Rule?
   A. Lead Service Line replacement
   B. Corrosion Control Treatment
   C. Public Education
   D. All the above.

3. Why is sodium thiosulfate added to bacteriological sample bottles?
   A. Kill the bacteria in the samples.
   B. Prevent contamination of samples.
   C. Neutralize disinfectant residuals.
   D. All the above.

4. What is the horsepower required to pump 880 gallons per minute (GPM) up to a reservoir 220 feet above the pump if the pump is 85% efficient?
   A. 48.8 HP
   B. 57.5 HP
   C. 220 HP
   D. 880 HP
5. Which of the following drinking water contaminants could cause porcelain fixtures to stain black?
A. Arsenic
B. Chlorine
C. Iron
D. Manganese

WASTEWATER COLLECTION GRADES 1 & 2
1. In a separated wastewater collection system, storm water is conveyed to a wastewater treatment plant.
A. True
B. False

2. What is the minimum velocity at which solids are maintained in suspension, called scouring velocity, in a wastewater collection system?
A. 1.0 Foot/Second
B. 2.0 Feet/Second
C. 3.0 Feet/Second
D. 4.0 Feet/Second

3. If an orange floats between manholes 600 feet apart in 2 minutes, what is the velocity in feet per second (FPS)?
A. 2.0 FPS
B. 3.5 FPS
C. 5.0 FPS
D. 7.5 FPS

4. What is the term used to indicate the method of opening a blocked sewer line by forcing a snake through the line?
A. Lamping
B. Rodding
C. Balling
D. Drilling

5. A pump is pumping 350 gallons per minute of wastewater through a 12 inch force main that operates completely full. What is the velocity in feet per second (FPS) through this force main?
A. 1.0 FPS
B. 2.0 FPS
C. 3.0 FPS
D. 4.0 FPS

WASTEWATER COLLECTION GRADES 3 & 4
1. Electric motors are the machines most commonly used to convert mechanical energy to electrical energy.
A. True
B. False

2. What is the operating volume in gallons of a wet well measuring 6 feet in diameter and with an operating level ranging from the top at 16 feet to the bottom at 2 feet?
A. 1000 Gallons
B. 1566 Gallons
C. 2960 Gallons
D. 39 47 Gallons

3. What is the term used to describe the lowest point of a wastewater collection channel?
A. Bottom
B. Flow Line
C. Invert
D. Elevation

4. What is the slope of a sewer line 1000 feet long with an upstream elevation of 2433.5 and a downstream elevation of 2396.0?
A. 0.0375 %
B. 0.375 %
C. 3.75 %
D. 37.5 %

5. A pump lowers the level in a wet well in 3 minutes. If the operating range is 15 feet and the diameter of the wet well is 4 feet, how many Gallons per Minute (GPM) is the pump producing if the influent is 225 GPM?
A. 160 GPM
B. 200 GPM
C. 470 GPM
D. 695 GPM

WASTEWATER TREATMENT GRADES 1 & 2
1. What is the volume in gallons of a basin 85 feet long, 25 feet wide, and 14 feet deep?
A. 223,000 Gallons
B. 250,000 Gallons
C. 500,000 Gallons
D. 750,000 Gallons

2. What is the name of the laboratory analysis that determines the consumption of oxygen over 5 days in wastewater treatment?
A. Suspended Solids
B. Settleable Solids
C. Dissolved Oxygen
D. Biochemical Oxygen Demand

3. What is the loading to an aeration basin in pounds per day per cubic foot (PPDPFC) if the filter is 85 feet in diameter and 20 feet deep with an influent flow of 9.6 MGD and an influent BOD of 248 mg/L?
A. 0.180 PPDPFC
B. 0.676 PPDPFC
C. 0.965 PPDPFC
D. 1.322 PPDPFC

4. What is the removal percentage of a sedimentation basin with an influent of 350 mg/L and an effluent of 45 mg/L?
A. 13 %
B. 63 %
C. 87 %
D. 95 %

5. If sludge is floating on the surface of a sedimentation basin, what might be the cause?
A. Insufficient flow into the basin.
B. Insufficient chlorine feed.
C. Broken sludge collectors.
D. Algae growth in basin.

WASTEWATER TREATMENT GRADES 3 & 4
1. “Seed” sludge usually contains considerable amounts of microorganisms.
A. True
B. False

2. What is the hydraulic surface loading in Gallons Per Minute Per Square Foot (GPMPSF) to a sedimentation basin 85 feet in diameter with a flow of 4.5 MGD?
A. 0.55 GPMPSF
B. 1.80 GPMPSF
C. 2.22 GPMPSF
D. 6.50 GPMPSF

3. What is the organic loading to a basin in pounds per day (ppd) with a flow of 8.34 MGD and an influent BOD of 250 mg/L?
A. 2850 ppd
B. 8641 ppd
C. 17390 ppd
D. 28280 ppd

4. Which of the following materials are readily decomposed in anaerobic digesters.
A. Fruit
B. Grit
C. Hair
D. Organic Plastics

5. What is the loading to an aeration basin in pounds per day per cubic foot (PPDPFC) if the filter is 85 feet in diameter and 20 feet deep with an influent flow of 9.6 MGD and an influent BOD of 248 mg/L?
A. 0.180 PPDPFC
B. 0.676 PPDPFC
C. 0.965 PPDPFC
D. 1.322 PPDPFC
Saturday, August 28, 2010, was more than just another beautiful day at the Omni Tucson National – it was competitive fun on the links, with over $27,000 raised for Water For People!

**Tournament Winners clockwise from top left:** i) Water For People Beneficiaries!! ii) 1st Place Team, with 52: Brad Callihan, Mitch Basefsky, Alan Manning (iii) 2nd Place Team with 53: David Modeer, Jeff Biggs, Dave Mahaffay, Jay Bailey (iv) 3rd Place Team with 54: Don Amico, Hector Iglesias, Steve Bunting, Matt Williams (v) Ladies Long Drive AND Closest to the Hole: Brandy Kelso (2nd from left) (vi) Mens Closest to the Hole: Dave Metz (3rd from left). Mitch Basefsky (Longest Putt) and Brad Callihan (Mens Long Drive) were double winners.

**Thanks to our participants, volunteers and sponsors.** As 884 million people lack access to safe drinking water, 2.6 billion lack adequate sanitation facilities, and nearly 6,000 people die daily from water-related illnesses, sustainable solutions are necessary to stem the global water crisis. In 2009, Water For People started to help over 325,000 beneficiaries and will follow and track its projects to verify that people are still being helped at 3, 6, and 10 years and verify that the projects lead to lasting solutions. Your support helps make it all happen!

--- Save the date for the next year’s tournament: Saturday, August 27, 2011 ---

For more information on all Water For People Committee Activities, visit http://azwater.org/Committees/WaterForPeople/pages/Default.aspx
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CALL FOR 2011 AZ WATER ASSOCIATION BOARD MEMBER NOMINATIONS

The Nomination Committee is accepting qualified and willing members to fill the Vice President and four Board Member positions within the leadership of the AZ Water Association for 2011. Nominees will be listed in the spring 2011 newsletter and voted on during the Annual Business meeting on May 5, 2011 at the AZ Water’s 84th Annual Conference & Exhibition in Glendale, Arizona.

Submit all should include nominee contact information and an explanation why this person should be considered for a leadership position within AZ Water. Please submit your nomination in writing by March 1, 2011 to the chair of the Nomination Committee:
Steve Davis
9246 W. Rascon Loop
Phoenix, AZ 85037
Cell: 520-444-3534
Email: sdcist@pimie.com

Director Duties

Directors are expected to attend all AZ Water Board Meetings (six per year) and other meetings as designated by the President. All director positions oversee assigned AZ Water committees. Directors must be members in good standing of the WEF, AWWA, and AZ Water. Terms are for one year, with an understanding that a three-year commitment is involved. Each year’s term is subject to re-election. If you have the energy, drive, and commitment to serve the AZ Water, please consider placing your name or the name of a colleague in nomination for a Board seat.

Vice President Duties

The Vice President serves within the structure of the Arizona Member Association of the WEF, Arizona Section of the AWWA, and the AZ Water. This position oversees the activities of various committees during June 2011 - June 2012. The Vice President shall assist the President and President Elect and shall be the presiding officer of the Association in the absence of both the President and President Elect.

The Vice President will have served as a Director, Secretary, or Treasurer of the AZ Water for at least one year and will have been a member of the AZ Water for at least one year and a member of both the AWWA and WEF as of the date of the elections.

The term for the Vice President is one year (2011-2012). This person must be willing to commit to move through the officer chairs and serve as President Elect, President, and first Past President (three additional years).

AZ WATER ASSOCIATION 2010-2011 BOARD MEMBERS

Front Row L-R: Frank Tantone, Paul Kinskella, Don Manthe, Brandy Kelso, Patty Kennedy, Teresa Smith-DeHesus, outgoing Past President Vance Lee, Jason Vernon
Back Row L-R: Kevin Conway, outgoing AWWA Director Mark Stratton, Chris Hill, Chuck Graf, John Bannen, Dan Lueder, Jack Bryck, Rick Buck (missing from photo, John Warner and Floyd Marsh).

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Jay Howe
Utilities Director
City of Safford
Safford, Arizona

Want to see Jay’s NATGUN tank? Just log onto www.natgun.com/jay or call us at: 1-800-826-8306
My hope is that this issue of Success and Fun will help each one of us change the way we think and act in our daily lives.

I recently heard a presentation from a speaker named Paul Tsika about TEAMWORK. It has been said that “teamwork makes the dream work”. Remember that there is no “I” in TEAM. The team is the key to success in our lives. Everyone is a member of some team, in fact everyone is a member of several teams. Think of the teams you are on personally and professionally. Some of you may not be the leader of your team, but that does not make you any less important to the success of the team and organization nor does it make you any less successful as a person when the team is successful. Which is more important, the hand or the arm; each play an important and critical role in any achievement. Within your organization, is the person on the backhoe more important than the person making the water main tap down in the trench? Each has their place in the order of things and the entire crew determines the success of the initiative. This is so true on each aspect of our water and wastewater businesses and in life itself.

In each organization, there must be an organizational structure. A good organizational structure does not take away from a person’s individuality it actually provides the structure to allow each individual to work more effectively as a team. The team’s organizational structure is what allows the group to accomplish more than the sum of the individual accomplishments. When the team wins everyone wins.

Remember that no two snowflakes are alike. That is true for each of us. None of us are identical. I am sure that each of you are glad about that!! Even a small snowflake when teamed together can close a road and stop everything in our organized society. Vince Lombardi said, “Build for your team a sense of oneness”. A team derives its strength from the sense of unity that comes from working together for a worthwhile purpose. I know that each of you understand the importance of safe and reliable water and wastewater services. Take some time to reflect on your team and how each of you can improve your contribution to the team.

The following are two acrostics for TEAM:

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When the team is successful, everyone is successful. Ask yourself the following questions:

- Am I really on the Team?
- Am I really walking in agreement with the leadership of the organization and my supervisor?
- Am I a person that people love to be around?
- Do I care for others on the team?
- Do I express gratitude to others on the team?
- Am I loyal to the organization?
- Am I a critical person?
- Do I promote unity?

I am honored to share my perspective on “SUCCESS and FUN”. I hope to hear from you, contact me at phendricks@cox.net if I can be of assistance to you.
The Goal is Crystal Clear

For over 30 years our goal has been to provide technical services improving accountability and increase revenues by maximizing distribution and collection system performance and optimizing distribution and collection system data, records, and mapping programs.

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  - Unidirectional Flow Testing
  - Cross Connection Control Survey & Inventory
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One of our best assets today in the utility business is having the right equipment and tools available to assess, inspect, and photograph the interiors of our water and sewer mains. In the early years (600 BCE through to the early 1800’s), many of the sewers were large enough for workers to walk (or crawl) through to facilitate the inspection and maintenance of those systems. As the modern collection systems evolved (starting in the mid to late 1800’s), smaller diameter pipes were used, therefore direct attention was no longer viable.

During World War II, many new technologies were developed (out of necessity) for military reasons and applications. After the war, entrepreneurs began to apply many of those new technologies to other needs. Soon, the cameras developed during the war by the Navy for remote monitoring of mechanical equipment on ships were being adapted for other uses after the war.

In the early 1950’s, the RCA Corporation commercially introduced the Vidicon imaging tube. This in turn allowed the development of smaller cameras to fit into smaller openings, pipes, and tubes. The power production industry began using the cameras in waterproof housings to inspect the water intake and discharge mains at their power plants. Sewer entities saw this and began to borrow these cameras to try and inspect their sewer mains. The Federal government soon wanted the industry to develop equipment to seal off ground water infiltration into sewers; such was soon achieved. Out of all that, a separate industry evolved. Did the development of Closed Circuit TV (CCTV) equipment start and thereafter evolve in the United States, in Europe (Germany) or on somewhat parallel paths? The answer (I believe) is probably on somewhat parallel paths, however, with different technologies and approaches.

The one path we’re going to focus on here is the European (or more specifically, the German) path. At the end of World War II, a German ship building company closed its Kiel, Germany offices. Their engineer, Helmut Hunger, set up a new business entitled “Ingenieur Buro Atlas, Kiel” and started producing electromedical equipment and echo sounding systems. Soon, underwater television systems became another of their product lines. The company changed its name to “IBAK” (the initials of its previous company name). In the mid-1950’s, they began production of a closed circuit camera rig to inspect the interiors of sewer mains. The following photos serve to illustrate the first units produced by IBAK and used to inspect sewers; the first being a sewer under an expressway in the City of Essen, Germany in 1958. The first four photos, illustrate the CCTV equipment used for that endeavor. The last photo shows the interior (controls, monitor screen) of a van that was part of a CCTV system being demonstrated by IBAK to a sewerage agency in the Saddle Brook, New Jersey area in the early 1960’s.

The purpose of this article is to illustrate and discuss some of the historical roots of our present day CCTV systems. It’s purpose is not to say that a certain group or company was the first to start the industry. Appreciate these roots and make use of what has evolved over the past 50-60 years in the sewer CCTV field. For routine assessment of your sewers is a must into today’s sewer management business.
ACROSS
1. The liquid that passes through a filter (8)
2. The “C” in COD (8)
3. The system an electrical stream flows in (7)
4. Liquid removed by a centrifuge (8)
5. Prefix meaning 1,000 (4)
6. Precedes sludge or carbon (9)
7. This is grown to produce Biodiesel (5)
8. Energy losses from flow resistance (8)
9. Dissolved Air Floatation (3)
10. It’s symbol is O3 (5)
11. Bacteria that oxidizes nitrite to nitrate (11)
12. Another term for de-watered sludge (4)
13. A small particule floc that doesn’t settle (3)
14. You might see one of these under the scope (7)
15. Type of bearing in high-speed blower (3)

DOWN
1. Distance between top of tank and normal level (9)
2. Liquid that has percolated through solid waste (8)
3. One of the states in the Tristate organization (7)
4. aeration has a high SR% (8)
5. One of the I’s in I/I (6)
6. Disease causing organisms (9)
7. Chemical symbol is As (7)
8. Connected to the Earth (8)
9. A catalyst produced in living cells (6)
10. The “F” in F:M (4)
11. Anoxic zones need this to stay anoxic (7)
12. Type of valve or a City in Arizona (5)
13. Electrical unit measuring resistance (3)
14. AZ Water used to be this (5)
15. Test to measure coagulation/flocculation (3)

WATER TREATMENT GRADES 1 & 2
WATER TREATMENT GRADES 3 & 4
WATER DISTRIBUTION GRADES 1 & 2
WATER DISTRIBUTION GRADES 3 & 4
WASTEWATER COLLECTION GRADES 1 & 2
WASTEWATER COLLECTION GRADES 3 & 4
WASTEWATER TREATMENT GRADES 1 & 2
WASTEWATER TREATMENT GRADES 3 & 4
Monthly Technical Luncheon Door Prize Sponsorship

It’s time to reserve your spot for the Monthly Technical Luncheon Door Prize Sponsorship. Sponsoring companies will be recognized each month at our AZ Water Technical Luncheon events in Phoenix and Tucson by providing a door prize and nominal contribution to support our program.

This season’s meetings will be held September 2010 through April 2011. See azwater.org for the upcoming events and topics. Don’t miss your chance!

The cost of sponsorship is only $100, which includes the following:

- A payment contribution of $50, and
- One $50 door prize or gift certificate/card to be raffled during the event.

We encourage all of our sponsors to attend the luncheon that you select to sponsor so that you can assist us in drawing the winning raffle ticket and giving away your prize to the WINNER!

For more information about our Door Prize Sponsorship Program, please contact our coordinator:

Lisa Culbert
Layne Christensen
Water Treatment Division
2533 E. North Lane, Phx, AZ 85028
Mobile: 602.332.3174

Please indicate which location you would like to sponsor and send checks payable to “AZ Water” and your gift certificate/card to Lisa Culbert. You can select either location to participate in, or both! Luncheons are held at the following locations:

<table>
<thead>
<tr>
<th>Phoenix</th>
<th>Tucson</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRP PERA Club</td>
<td>Inn Suites Tucson City Center</td>
</tr>
<tr>
<td>One East Continental Drive</td>
<td>475 N. Granada</td>
</tr>
<tr>
<td>Tempe, AZ 85281</td>
<td>Tucson, AZ 85701</td>
</tr>
<tr>
<td>Daniel Candelaria - Chair</td>
<td>Lisa Culbert - Chair</td>
</tr>
<tr>
<td><a href="mailto:Daniel.Candelaria@CH2M.com">Daniel.Candelaria@CH2M.com</a></td>
<td><a href="mailto:lculbert@laynechristensen.com">lculbert@laynechristensen.com</a></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:joy.Terry@CH2M.com">mailto:joy.Terry@CH2M.com</a></td>
</tr>
</tbody>
</table>

Thank you for supporting the AZ Water Association!
ON THE MOVE

LISA CULBERT JOINS LAYNE CHRISTENSEN
Lisa Culbert recently joined Layne Christensen and accepted the position of National Marketing Manager for the Water Treatment Division. According to Lisa, with the recent acquisition of Chandler-based MCL Technology Corporation, Layne can now offer Deionization (DI) and DI tank exchange programs and membrane cleaning for the high purity industry to support manufacturing and medical facilities, power plants and food and beverage processing plants. Layne also has capabilities to fabricate a multitude of water treatment systems including RO systems.

The Water Treatment Division will be headquartered at a new facility located at 3804 E. Watkins in Phoenix, Arizona. Lisa said, “We are currently in the process of preparing our new facility for occupancy which will include expanding our current DI regeneration capability and adding regeneration of LayneRT (arsenic removal resin). This local facility will be known as the Layne “Center of Excellence” as it will be home to a laboratory, equipment fab shop, regeneration and our expanding service group.”

Lisa can be contacted at the Layne Christensen Company at 602-332-3174, or by email at lculbert@laynewater.com. Website: www.laynewater.com.

VANCE LEE JOINS WATER WORKS ENGINEERS
Water Works Engineers is pleased to announce that Vance G. Lee has joined their staff in Scottsdale, Arizona. Mr. Lee brings his more than 40 years of experience in the study and design of water infrastructure and treatment projects to enhance the capabilities of Water Works Engineers in Arizona. Mr. Lee served as President of AZ Water in 2008-2009 and was honored with the Engineer of the Year award at the 2010 AZ Water Annual Conference. Mr. Lee has worked to help provide potable water to Arizona residents for over 29 years, and intends to continue his commitment to Arizona, now with Water Works Engineers.

TRIVIA QUESTIONS
(FROM THE OFFICE OF THE AZ WATER ASSOCIATION HISTORIAN)

A. How does Arizona’s Maricopa County compare (in size) to counties elsewhere in the United States?
B. What is the origin of Tombstone, AZ?
C. Who was the first President of the United States to use “radio” to communicate with the American people?
D. When was the motorcycle first patented?
E. Who discovered gold in Alaska?

SEE ANSWERS ON PAGE 43
ADEQ is offering **FREE** training at the following dates and locations. Earn your PDHs while you improve your skill in the topics offered.

- September 28-29, 2010 – Pinetop
- October 14, 2010 – Phoenix
- October 19-20, 2010 – Oracle
- October 26-28, 2010 – Flagstaff
- November 16-17, 2010 – Sedona
- December 7-8, 2010 – Yuma
- December 9, 2010 – Phoenix
- January 6, 2011 – Phoenix
- January 11-13, 2011 – Casa Grande
- January 12-13, 2011 – Tubac
- February 10, 2011 – Phoenix
- February 15-16, 2011 – Camp Verde
- March 10, 2011 – Phoenix
- March 15-16, 2011 – Kingman
- March 23-24, 2011 – Sierra Vista
- April 14, 2011 – Phoenix
- April 26-27, 2011 – Tucson
- May 12, 2011 – Phoenix
- May 17-18, 2011 – Prescott
- June 9, 2011 – Phoenix
- June 14-15, 2011 – Flagstaff

*note: dates listed are subject to change. Please visit [www.azdeq.gov](http://www.azdeq.gov) for official dates and locations.*

The ERG program was developed to provide training and benefits to eligible, certified operators. However, any operator or community member may attend department-sponsored technical training.

Noah Adams, ADEQ, (602-771-4511, nra@azdeq.gov) will address questions concerning workshops.

Space is limited so please pre-register ASAP! Register online at: [http://www.OPSCERT-ERG.com](http://www.OPSCERT-ERG.com) For registration questions please contact April Adams, Corporate Destination Services, at april@corpdest.com or phone (602-482-1788) fax (602-482-2113).

**Special hotel room rates are available; however you must reserve rooms in advance and request the ADEQ rate.**
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TRIVIA ANSWERS

(FROM THE ARIZONA HISTORIAN ON PAGE 39)

A. Maricopa County is the 14th largest county in the United States. It contains roughly 5.9 million acres and it is approximately the size of the states of Massachusetts, Rhode Island and Connecticut combined.

B. In 1877, prospector Edward Schieffeln began a search for silver in an area approximately 70 miles southeasterly of Tucson. Later that same year, he found one of the largest silver veins in the West and named it the “Tombstone Lode”. The town of Tombstone grew from nothing to a boomtown virtually over night … by 1881, it had over 10,000 residents.

C. President Warren G. Harding on June 14, 1922 as he addressed a crowd gathered to dedicate a memorial to Francis Scott Key; the composer of the Star Spangled Banner. Three years later, President Calvin Coolidge delivered the first presidential address via radio.

D. Gottlieb Daimler patented the first motorcycle in August 1883. The motorcycle really didn’t gain in popularity until after World War I, where it was used by several of the involved nations’ armies.

E. George Carmack stumbled upon gold while salmon fishing along the Klondike River in the Yukon in August 1896; thus, creating the last great gold rush in American history … a rush during which over 50,000 people journeyed to Alaska to seek their fortune.
ENVIRONMENTAL ANALYTICAL SERVICES WORKSHOPS - **TRAINING AND FREE PDHs**

Legend Technical Services of Arizona, Inc. (LEGEND), a full-service environmental laboratory, is providing assistance to water and wastewater operators and the environmental community in obtaining training and professional development hours (PDHs) through free workshops held throughout Arizona. Workshops will be held in outreach areas as well as in the Phoenix and Tucson metropolitan regions.

Please check the AZ Water Association website (www.azwater.org) for upcoming workshops:

**August 25, 2010 – 2 PDHs**
Sonora Clubhouse
600 West Camino Rancheria, Sahuarita, AZ 85629
9:15 AM – 12:00 PM
Coliform Bacteria-Sample Collection and Analysis – Robert Vertefeuille
General Overview of Sample Containers, Preservatives & Hold Times - Lisa Parrish

**September 7, 2010 – 2 PDHs**
Town of Wickenburg Conference Center
160 N. Valentine St., Wickenburg, AZ 85390
9:15 AM - 12:00 PM
Sampling, Monitoring, and Lab Forms – Dianne Frydrych, Sales & Marketing Mgr.
Coliform Bacteria-Sampling and Analysis – Robert Vertefeuille, Legend Director of Operations

**October 28, 2010 – 2 PDHs**
City of Cottonwood Recreation Center
150 South Sixth St., Cottonwood, AZ
9:15 AM – 12:00 PM
Coliform Bacteria-Sample Collection and Analysis – Robert Vertefeuille
General Overview of Sample Containers, Preservatives & Hold Times – Lisa Parrish

**November 30, 2010 – 6 PDHs**
City of Chandler-Chandler Downtown Library, Council Chambers
22 S. Delaware St., Chandler, AZ 85225
8:45AM – 4:00PM
Coliform Bacteria Sampling & Analysis – Robert Vertefeuille, Legend Director of Operations
EPA Total Coliform Rule – Suzanne Price, ADEQ
EPA Groundwater Rule – Donna Calderon, ADEQ
Lunch (on your own)
Operator Certification Updates, Contract with Gateway CC & OPCERT Exam - Bill Reed, ADEQ
Sample Containers, Preservatives & Hold Times - Lisa Parrish, Legend Client Serv. Mgr.
Sampling, Monitoring and Lab Forms – Dianne Frydrych, Legend Sales & Marketing Mgr.

**Class sizes will be limited. Please register by contacting Dianne Frydrych, Sales and Marketing Manager:** (602) 324-6121 or dfrydrych@legend-group.com
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AZ Water Association Membership Form

This information will be added to our database and used to inform you of opportunities specific to your needs. Your contact information will also be used in our annual membership directory. If you do not want this information published in our annual directory, please check here ☐.

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☐ public owned municipal or special district, water, wastewater treatment system or plant process < 1mgd
☐ administration and/or enforcement of government environment programs administration of public health programs

PRIVATE ENTITY
☐ private or investor owned facility
☐ private industrial systems
☐ consultant
☐ contractor
☐ manufacturer (equipment or representative)
☐ distributor (equipment or representative)

OTHER ENTITIES
☐ educational institutions (all components)
☐ research laboratory
☐ other __________________________

FIELD SERVED
☐ water supply only
☐ wastewater only
☐ both industries
☐ other __________________________

ENVIRONMENTAL FOCUS
☐ wastewater
☐ water
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☐ ground water
☐ solid waste
☐ storm water
☐ pollution prevention
☐ residual/biosolids management
☐ coastal, river, lake ecology/surface water
☐ toxic & hazardous materials
☐ public education / information
☐ instrumentation/automation controls
☐ other __________________________

Member Dues are Subject to Change

☐ Individual Annual Membership — $40  ☐ Student Annual Membership — $15

RETURN YOUR MEMBERSHIP APPLICATION ALONG WITH ANNUAL DUES TO:
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