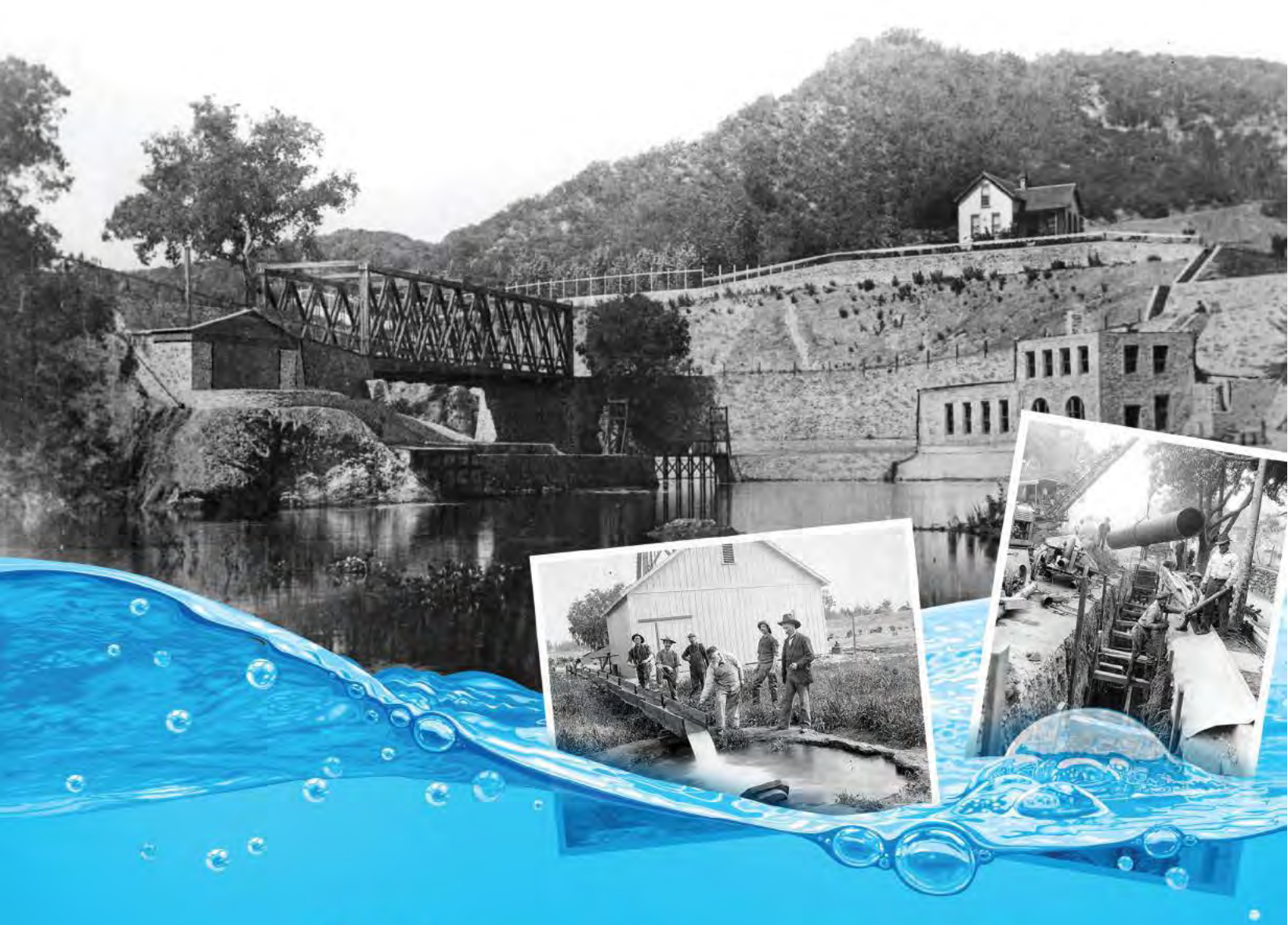


Pasadena Water

THE ESSENTIAL INGREDIENT

CELEBRATING 100 YEARS

OF MUNICIPAL WATER SERVICE

PASADENA
Water&Power

PASADENA WATER CENTENNIAL
100 YEARS
1912 - 2012

PASADENA WATER CENTENNIAL 100 YEARS 1912 - 2012

Pasadena Water

THE ESSENTIAL INGREDIENT

History By
Timothy F. Brick

Contributing Author
Audrey Eftychiou

Editors
Audrey Eftychiou
Erica Rolufs
Valerie Howard

Acknowledgements

Phil Auzenne
Bill Bangham
Brad Boman
Phyllis E. Currie
Holly Imler
David Kimbrough
Eric Klinkner
Chris Klippert
Karl Johnson
Shan Kwan
David Jones
William Jordan
Nancy Long
Ben Mitchell
Vangie Paragas
Diana Pascarella
Doug Ross
Christina Shieber
Sharon Stovall
Gary Takara
Aldolfo Vargas
Roumiana Voutchkova
Steve Whitaker
Mary Yamashiro

The Pasadena Museum of History

The Pasadena Central Library

Raymond Basin Management Board

A Message from the General Manager

To us, it's about people.

The Pasadena Water Department is proudly celebrating a century of service in 2012, and anywhere you turn in this 100-year story, you'll find characters with grit, perseverance and vision.

Pioneer Benjamin Eaton developed the first irrigation ditch, and later an enclosed pipeline that sustained our early homesteads and orchards.

In 1912, as local enterprises prospered, the Pasadena City Council united a scattering of private water companies to form a strong and streamlined municipal utility to serve our growing burg. Our people dug wells, erected reservoirs, laid miles of pipeline, forged partnerships and championed new ideas that allowed Pasadena to flourish.

Today, our story is about the hundreds of men and women of the Pasadena Water Department who continue this legacy of providing safe, reliable water to our vibrant city. The engineer sketching innovations for the future. The troubleshooter roused from his bed for midnight repairs. The chemist standing guard against potential contaminants. The conservationist helping small business owners cut waste. The quiet kid, fresh from the Army, installing water mains and digging into a deep reserve of confidence and pride.

All are focused on serving the most important people of all – you, our customers. And with your continued support, we're eager to start our next exciting chapter.

Sincerely,

Phyllis E. Currie
General Manager

Pasadena Water
The Essential Ingredient

Pasadena Water Then and Now: Technology Rules

Mud, muck, slide rules and wrenches. Before the computer age, Pasadena's water system was tended by hand.

Crews monitored our reservoir levels by driving over and taking a look, and then manually flipped switches to fill them up again. Mountain runoff was filtered with sand and cleaned with little more than chlorine before it was delivered to thirsty customers. Water main breaks and booster pump failures were phoned in by customers wondering what happened to their water pressure. Engineers sketched out expansions with pencils and paper, and problems were fixed with a tool belt and elbow grease.

Today, state-of-the-art technology has made our resource planning more effective, our distribution system more efficient, working conditions safer for our crews, and our product – drinking water – better than ever.

With hundreds of telemetry points, PWP's advanced Supervisory Control and Data Acquisition (SCADA) system allows water staff to monitor the

Pasadena is a community blessed with rich natural resources. Pleasant weather, rainfall, and fertile soil have drawn settlers to this area since the first Native American wandered into what we now call the San Gabriel Valley thousands of years ago. It was, however, not until the establishment of the Pasadena Water Department 100 years ago that our community was able to count on a reliable supply of water, the key ingredient to our region's prosperity.

This is the story of the men and women who have demonstrated the vision and diligence to meet every challenge and overcome every obstacle to provide that essential ingredient, water, to shape the Pasadena of the 21st century.

The Early Settlers

The first settlers of our region, the Gabrielino Tongva people, established their settlements near the abundant springs and streams and along the Arroyo Seco on the western edge of what is now Pasadena. When the Spaniards arrived in the 1770s, they tapped the streams flowing across the Raymond Fault on the southern edge of Pasadena to power grain mills and irrigate agriculture, making the nearby San Gabriel Mission the richest of California's missions. One hundred years later in 1874, when the founders of the Indiana Colony established the San Gabriel Orange Grove Association, their first task after dividing up the land among the new settlers was to develop a reliable water

Courtesy of the archives, Pasadena Museum of History

supply for human and agricultural use. That key mission was assigned to Benjamin Eaton, the early pioneer who diverted the waters of El Precipicio (Eaton) Canyon and the Arroyo Seco and brought them onto the Pasadena mesa to establish a prosperous agricultural community.

Before Pasadena was incorporated as a city in 1886, the governance structures for the attractive new community were the land and water companies that the pioneers established. Each landowner also held water rights and a share of the land and water companies.

But as the Crown of the Valley grew beyond its agricultural origins and became one of the most desirable communities in Southern California due to the pleasant climate and spectacular setting, it became clear that the land and water companies lacked the financial resources and administrative structure to provide a reliable water supply for an emerging city.

Fighting for Municipal Water

While leaky pipes and inadequate pressure frequently plagued early Pasadena residents, it was the drought of 1898 that shocked them into the realization that a more dependable water system was needed. Renowned engineer J. B. Lippincott, an associate of William Mulholland, warned Pasadenans that local sources were being rapidly depleted and stressed the need to develop outside sources promptly. Business leaders in the Board of Trade, predecessor of the Pasadena Chamber of Commerce, led the call for the consolidation of the three major land and water companies into one municipal utility that would have the funding base and public backing to provide reliable service. Residents, realizing the benefits that would come from better service and reliability, were enthusiastic about the prospects for such a city-operated enterprise. For the next fourteen years, however, civic leaders and citizens fought bitter battles over the valuation of the local water systems that delayed the establishment of the water department.

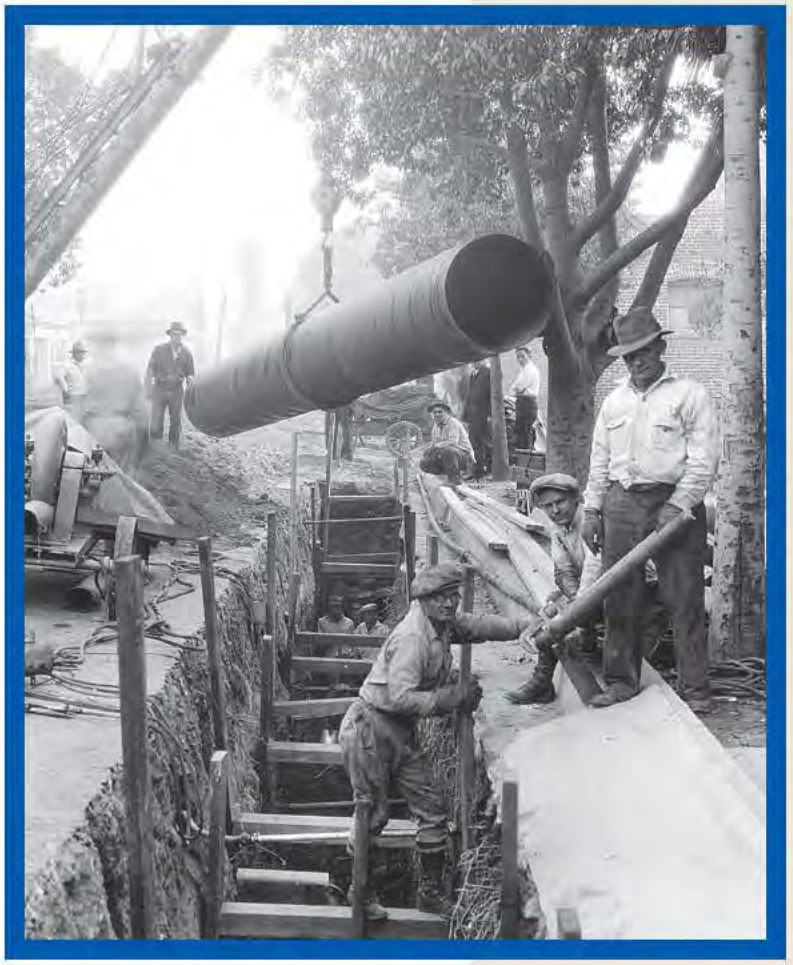
In 1905, Pasadena voters by a 2/3rd margin approved a series of bond measures that included purchase agreements for the three major water systems and for water rights on the San Gabriel River near Whittier. A million dollars was appropriated for the purchases but the new mayor, William Waterhouse, blocked the issuance of the bonds because he felt the price offered was too high. Factions formed and ferocious name calling ensured. Each municipal election

entire water distribution system, maintain reservoir levels, dispatch repair crews, adjust water quality and track citywide usage via special laptop computers, 24 hours a day from any point in town.

With the Geographic Information System (GIS), based on satellite technology, PWP is working to document data on every inch of the water system – from booster pumps to fire hydrants to customer meters - on computerized maps of the city.

PWP's engineers are now proficient in high-tech software like AutoCAD to prepare project drawings faster, better and more efficiently.

PWP's Water Quality Lab now employs state-of-the-art technology to complete 30,000 tests every year, detecting contaminants on a molecular level. With same-day results, PWP can correct any problems much more quickly.



Nearby, at the brand-new Monk Hill Water Treatment Facility, PWP is pioneering the use of ion exchange and liquid-phase granular activated charcoal systems to remove rocket-fuel byproducts and volatile organic compounds from four city groundwater wells.

Our meter readers use radio-frequency receivers for spot-on reads (and to avoid angry dogs). And from the comfort of home, PWP customers can pay their bills, check their water and power usage, download rebate applications and report outages 24 hours a day by phone or Internet.

But after witnessing the leaps and bounds of technology over the past three decades, PWP Field Crew Supervisor David Jones summed up PWP's enduring credo: "Computers only do what you tell them to do," he said. "It still takes a human touch."

for the next seven years turned on the pivotal issue of the value of the old water systems and the benefits of a new municipal utility, with proponents and opponents trading the local seats of power.

During these same years, Los Angeles was building the Owens Valley Aqueduct to bring in water from the Eastern Sierra Nevada Mountains. Pasadena officials cautiously explored the possibility of getting some of that new water from 250 miles north, but Los Angeles made it clear that the price was annexation and the loss of independence for Pasadena. That was far too expensive for proud Pasadenans, who cherished their prestigious community and its rich cultural values.

Finally, in 1912 Mayor William Thum, who had once opposed the bond issues to buy up local water systems, shaped a consensus on how to fairly value those old pipes and pumps and to develop a municipal water department, and the Pasadena Water Department was established on November 1, 1912. Samuel B. Morris was enlisted to serve as Chief Engineer and General Manager, a post he held for the next 22 years.

The long torturous campaign for a municipal water system solved an essential problem, and it solidified Pasadena's determination to remain independent. In the call for regional cooperation to develop a new water supply, the seeds of the Metropolitan Water District and the Colorado River Aqueduct that came in the late 1920s were planted.

The new water department faced many challenges in its first years of operations. Pasadena eventually purchased ten local water companies, most of which had lacked the financial resources to build and maintain their facilities. Numerous parts of town had insufficient pressure, and many of the old water mains had to be replaced because of all the leaks that developed when the systems were connected to new reservoirs and pipelines. The greatest obstacle for the new department, though, was the ongoing shortage of working capital that limited funding for improvements and was only slowly resolved by increased rates and reserves over the course of many years.

The Search for New Supplies

Morris and the Water Department crew set out to upgrade the old water infrastructure and to find a new water source to provide for the rapidly growing community.

By the early 1920s, water had become a critical problem for most Southern California cities. However, Pasadena was particularly hard-hit and aggressive in its pursuit of new supplies. Until then, stream flows from the San Gabriel

Mountains and numerous wells had met local needs. But by the 1920s the water level in the underground Raymond Basin beneath the city was falling ten feet a year due to occasional dry spells and ongoing excessive pumping. When the Copelin well was drilled during the drought of 1899, it found water at 154 feet. By 1924, the water level had fallen to 190 feet; by 1929 it was at 240 feet. Local pumping, facilitated by newly invented hydraulic pumps, was draining the Raymond Basin by 10,000 acre feet each year. Each acre foot (AF) is equivalent to the amount of water it would take to fill a football field to a depth of one foot or 325,851 gallons.

In 1914, Pasadena Water initiated a spreading program near the mouth of the Arroyo Seco to capture more storm water and stream flow in shallow basins that would allow the water to percolate into the groundwater basin beneath. Still the water table continued to recede because local residents and businesses were using more than nature supplied.

From 1912 to 1934 Water Chief Samuel B. Morris led the search for prospective sources like Lake Arrowhead and the West Fork of the Mojave River, but these were eventually abandoned due to legal concerns. Morris' engineers investigated a reservoir site in the Chevy Chase district of Glendale for waters from Sespe Creek in Ventura County and studied dam locations at the mouth of the Arroyo Seco, in Eaton Canyon and in Tujunga Canyon to capture floodwaters and stream flow.

Birthing the Metropolitan Water District

In the meantime, Morris and the Pasadena Water Department began rallying other Southern California communities to work cooperatively to develop a water supply that would benefit all of Southern California. Flooding on the Colorado River had plagued the farmers in the agriculturally rich Imperial Valley in the southeastern corner of California for many years, and so the concept of a grand dam was proposed to alleviate that hazard and to provide

Looking Ahead to the Future - Pasadena's Water Integrated Resource Plan

The Pasadena City Council unanimously approved the city's first ever Water Integrated Resource Plan in spring 2011, a complex document that maps out a reliable, cost-effective and environmentally responsible water supply for the next 25 years.

Crafted with broad community input, the detailed plan was designed to buffer Pasadena from perpetual threats to the city's water supply, including years of drought on the Colorado River, pumping restrictions in Northern California, record low local rainfall, dwindling groundwater and looming global warming.

"Just as Pasadena has done in so many other areas, we wanted to chart our own course, make our own plans and boost our own independence," said Water Engineering Manager Brad Boman.

The plan of action calls on PWP to step up its conservation and water-efficiency programs, maximize storage of mountain runoff, infuse more imported water into the Raymond Basin aquifer, create a recycled water system for irrigation, and promote stormwater and graywater capture programs.

Not only will these strategies help boost our local supply and cut costs for customers, they'll advance the city's goal of permanently cutting per-capita water use by 10 percent by the year 2015.

water for agriculture. The rapidly growing cities of the Southwest recognized that the hydroelectricity generated by such a dam could also light their communities, and electric revenues could be used to pay for the massive federal dam. The drought of 1923, though, spawned a new recognition that the great dam, Hoover Dam as it was later named, could also be a water source for urban Southern California. William Mulholland, the legendary water visionary of Los Angeles, sent a crew to the mighty Colorado River 250 miles to the east to research possible routes, but the leaders of Pasadena and other Southern California communities realized that bringing the Colorado River to the coastal plain of Southern California was a task too big for even Los Angeles. By working cooperatively in partnership with Los Angeles, they could assure their independence and a large water supply for future generations of Southern Californians.

Pasadena provided the leadership to make that dream live. Samuel Morris and Hiram Wadsworth, Chairman (Mayor) of the Board of City Directors, as the city council was then known, first called together the cities of Southern California to discuss collaboration in 1924. Wadsworth then chaired the Colorado River Aqueduct Association that gave birth to the Metropolitan Water District of Southern California, and Pasadena City Attorney John Howard drafted the legislation that created the new regional agency.

The first board meeting of the Metropolitan Water District of Southern California was held at the Huntington Hotel in Pasadena on December 29, 1928. Wadsworth passed the reins of leadership to Franklin Thomas, head of the Engineering Department at Caltech, who became the first vice chairman of the new agency and chairman of the engineering committee that directed the construction of the Colorado River Aqueduct. He served there until 1951 and also served on the Colorado River Board of California.

Morris Dam and the San Gabriel River

Pasadena's commitment to a reliable water supply was quite remarkable even in arid Southern California. Not only did civic leaders take a leading role in establishing the Metropolitan Water District with the other cities of Southern California, but Pasadena Water simultaneously pushed ahead with a new alternative water supply from the San Gabriel River 15 miles to the east.

In 1922 Pasadena filed for the excess floodwaters in San Gabriel Canyon flowing into the Pacific Ocean. Pasadena officials were determined to secure a reliable water supply from the San Gabriel River for the next 25 years. They pledged

that Pasadena would only take unused flood flows that were not captured by other communities, but still there was intense opposition from Long Beach and other downstream cities.

In a hotly contested decision in 1928, the California Division of Water Resources granted Pasadena permits to store and divert up to 4,000 acre feet per year of those flood flows of the San Gabriel River. The next spring Pasadena voters approved a $10 million bond issue to finance the construction of a dam on the San Gabriel River and a conduit to the city. The San Gabriel Valley Protective Association sued to prevent the building of the dam, but the newly formed Metropolitan Water District, in one of its first actions, helped resolve the dispute by agreeing to purchase the dam from Pasadena once Colorado River water became available. Pasadena would then abandon its claim to San Gabriel River water.

So in 1932 Pasadena Water Department began construction in Azusa Canyon of Pine Canyon Dam, a 325 feet tall and 756 feet wide concrete gravity dam designed to hold 42,000 acre feet of water in its reservoir. Upon its completion two years later, the dam was renamed Samuel B. Morris Dam after the Chief Engineer and General Manager of the Pasadena Water Department.

In 1941 MWD delivered the first supplies from Colorado River to Pasadena, and Morris Dam was transferred to MWD, which managed it until 1995 when it was transferred to the Los Angeles County Flood Control District. The dam, an engineering marvel that impounds the 417-acre Morris Reservoir in the Angeles National Forest a few miles northeast of Azusa, is now utilized primarily for flood management and flow regulation for groundwater recharge in the San Gabriel Valley.

Water Statistics

Service Area Population	161,300
Service Area Square Miles	26
Miles of Water Mains	508
Average Yearly Rainfall	20.4 in
Number of Wells	16
Number of Reservoirs	14
Reservoir Capacity	110 million gal
Number of Treatment Plants	1
Number of Booster Stations	19
Number of Meters	38,067
Water Produced in 2011	9.9 billion gal
41 percent from groundwater	
58 percent purchased from MWD	

Dividing Up the Raymond Basin

While Pasadena was working for new water from the San Gabriel River and the Colorado River during the 1930s, local groundwater levels continued to fall. Raymond Basin pumpers, motivated by the steadily increasing population and improved pumping technology, persistently drew water from the groundwater basin without fully understanding the effects of their actions on each other and on the basin.

The first water wells in Pasadena had been drilled way back in 1881 at the southern end of the city where the Raymond Hotel, a renowned resort, was located. Early residents saw ancient springs and water gushing to the surface in artesian wells, but they did not understand the relationship between those phenomena and the Raymond Dyke or earthquake fault that lined the lower limits of the city. Limited by the science of that era, they had only a primitive understanding of the nature of the Raymond Basin, the 40-square-mile groundwater basin or aquifer beneath Pasadena and surrounding communities.

Groundwater hydrology or hydrogeology was a science in its infancy, and the Raymond Basin provided many invaluable lessons to that emerging science. It took many decades to understand the nature of the groundwater basin and how to manage it.

The Raymond Basin is like a massive bowl of sand and gravel that is filled up by the flows of the Arroyo Seco coming from the upper watershed in the San Gabriel Mountains and by rainfall from throughout the watershed that slowly seeps into the ground. The rich alluvial soils in the foothills are like a sponge soaking up rainfall and percolating it into the aquifer. But the buildings, roads and paving that came with urban and suburban development reduced the ability of the earth to capture the steam flow and rainfall. New advances in pumping technology made it too easy to drain the basin without considering the long-term significance of destroying such a valuable natural resource.

By the turn of the 20th century, there were 140 hydraulic wells pumping water from the Raymond Basin. In 1914 the new Pasadena Water Department tried to alleviate the falling groundwater levels they observed by spreading the stream flow of the Arroyo Seco water on the sandy soils near the San Gabriel Mountains to replenish the groundwater. Groundwater levels, however, continued to decline. The first full description of Raymond Basin's geology and underground water storage characteristics was not completed until 1934, and the findings were ominous. They documented a consistent drawdown of the basin for more than two decades.

In 1935 Pasadena officials called together all the entities that were pumping from the Raymond Basin, including local communities, small private water companies and large institutional water users like the Huntington Library and Mountain View Cemetery, in an attempt to reduce pumping to a sustainable level, but this effort was not successful. Pasadena realized that all the pumpers, including Pasadena, shared in the problem and that all should share in the solution, but found little cooperation from its neighbors because there was not yet a legal framework for determining water rights in the aquifer. Two years later Pasadena initiated legal proceedings against Alhambra and other major Raymond Basin water users. The City of Pasadena v. City of Alhambra et al. lawsuit sought to legally divide or adjudicate water rights in the basin and to end the annual overdraft or drawdown of groundwater.

Superior Court Judge Frank Collier called for a detailed geological study of the groundwater basin to determine its characteristics and capacity. Distinguished Caltech geologist John Buwalda conducted that study. The California Division of Water Resources played the role of referee, verifying the data and conclusions. The study, an early milestone in groundwater modeling, indicated that the safe yield of the basin was 21,000 acre feet per year, but that pumpers were drawing out 29,000 acre feet, more than a third too much.

In 1943 after an extensive investigation of the usage and "safe yield" of the Raymond Basin, all but one of the 20 parties involved in the action agreed to a stipulation that included: 1) an admission that taking water was adverse to the claims of other parties; 2) allocation of the basin's safe yield; 3) the declaration and protection of each party's rights; and 4) an arrangement for

the exchange of pumping rights among parties. The historic agreement was based on a process called mutual prescription. Instead of honoring only senior water rights and cutting off pumpers with more recent claims, as was often done throughout the US, each party agreed to reduce its annual pumping and take a set percentage of the Basin's safe yield. Judge Collier determined that each party had a "present unadjusted right," defined as the highest amount of water continuously produced during a five year period prior to the filing of the lawsuit. Each party owned this right by "prescription" or longstanding use, and the rights were of equal priority. Judge Collier then defined a "decreed right" for each party, which was that party's present unadjusted right adjusted downward about one-third so that the sum of all parties' decreed rights matched the estimated safe or sustainable yield of the basin.

On December 23, 1944 Judge Collier signed the judgment adopting the stipulated agreement worked out by the parties. The California Department of Water Resources became the watermaster for the basin, charged with policing the adjudication. In 1949 the California Supreme Court affirmed Pasadena v. Alhambra. The decision validated mutual prescription as a basis for establishing water rights and resolving groundwater management problems.

The Raymond Basin Adjudication that resulted from City of Pasadena v. City of Alhambra et al. was the first groundwater adjudication or division of water rights in California and the first to use the California Division of Water Resources to determine water rights. The agreement still provides the framework for the management of local groundwater supplies. A major advance in the science and governance of groundwater basins, it has been praised as an exemplary model of cooperative self-government.

In 1955 the estimated safe yield was adjusted to 30,622 acre-feet. In 1984 the Raymond Basin Management Board, made up of representatives of the local parties, assumed watermaster responsibilities for managing the basin. The Raymond Basin Management Board (RBMB) has been a cooperative mechanism for local management of groundwater resources, while retaining the safe yield concept of the original adjudication.

In the early 1990s, the RBMB established long term storage policies and allocated storage capacity to the basin parties, an important step in allowing all parties to benefit from the storage potential of the basin and improving the management of local water resources. In 1992 Pasadena Water installed facilities for injecting and spreading imported water in the local groundwater basin to augment its replenishment activities

In 2007 a study commissioned by the Raymond Basin Management Board found that in the main part of the Raymond Basin groundwater production has been greater than net recharge from rainfall, causing lower groundwater levels and increased pumping costs. To remedy this, Raymond Basin pumpers in the main basin agreed to reduce their pumping allocation by thirty percent over a five year period. Pasadena's allocation was reduced by 417 acre feet in 2009 and is being reduced by a similar amount each year until 2014.

Post World War II

As Pasadena grew and thrived in the post-World War II period, the Water Department focused on supplying reliable and healthy water to a growing community and expanding the storage reservoirs and distribution system.

When Morris Jones retired as General Manager in 1951, he had already served the Water Department for 40 years. He started with the department four months after it had been established in 1912 when it served 20,000 customers through 8,300 meters. By 1951, the Department supplied 130,000 customers and 38,000 meters. Gross revenues recorded in the first annual report in 1914 were $118,420. By 1952 they had climbed to $2,136,000.

During Jones' service, the department built 400 miles of cast pipe and eight reservoirs including the 50,000,000 gallon reservoir in Hastings Ranch named for him. After retirement from the Department, Jones was named Pasadena's MWD Director, succeeding Franklin Thomas. Veteran Pasadena Water engineer Duncan Blackburn became the new General Manager.

In 1967 the Pasadena Water Department was consolidated with the Light and Power Department to form the Pasadena Water & Power Department (PWP). John Behner, who had served as Water Department General Manager following Blackburn, became the first General Manager of the consolidated water and electricity operations.

Pasadena Water and Power has continued to have strong leadership on the water side. Water engineer Karl Johnson, became General Manager of PWP in the 1970s and served as Pasadena's director to MWD. Willard Bangham led the water division for many years and provided strategic leadership to the Raymond Basin Management Board. Thomas Underbrink was a visionary water engineer who conceptualized the Devil's Gate Multi-Use Project, an integrated resource management program that later resulted in improved management of the Hahamongna basin. Shan Kwan began his career with PWP in 1985 and has served as the Assistant General Manager for the Water Division since 1997. During his tenure, he has overseen many capital projects to replace and rehabilitate Pasadena's aging infrastructure, while representing Pasadena on the Raymond Basin Management Board.

The State Water Project

In the early 1970s a new source of water from the State Water Project in northern California enhanced Pasadena's and Southern California's water supplies. Water from the Sacramento and San Joaquin Rivers flows into the San Francisco Bay and Sacramento/San Joaquin Delta where it is pumped through the 444 mile California Aqueduct to supply agriculture in California's fertile Central Valley and to homes and businesses in the Bay Area and in Southern California. Water experts and political leaders have worked for decades to reduce the negative impacts of diversions and pumping on the fragile bay Delta ecosystem. Now a new plan, the Bay Delta Conservation Plan (BDCP), has been developed and is being finalized by state and federal officials. BDCP is designed to achieve the co-equal goals of providing for the conservation and management of aquatic and terrestrial species, including the restoration and enhancement of ecological functions in the Sacramento-San Joaquin River Delta, and improving current water supplies and the reliability of water supply delivery conveyed through the State Water Project (SWP) and the Central Valley Project (CVP)

1971
Pasadena receives water from the State Water Project

1974
U.S. Congress passes Safe Drinking Water Act

1997
Perchlorate found in groundwater leads to closing of 4 wells in Northwest Pasadena

2002
Water System Master Plan is adopted

2009
City enhances water shortage and waste ordinance, Level 1 Water Shortage declared

2011
Monk Hill Water Treatment Plant Begins Operation

Pasadena's Integrated Water Resources Plan is adopted

2012
100 Years of Pasadena Water Celebrated

The Water Quality Commitment

Just as our knowledge of hydrogeology and ecosystems has expanded in the last 100 years, so too has our understanding of drinking water quality and its importance to public health. Indeed advances in water testing, treatment and technology are among the most significant public health advancements of the 20th Century, and Pasadena Water had kept pace with those developments.

Disinfectants like chlorine, which were first introduced in the US around the time that Pasadena Water was established, have dramatically reduced the number of waterborne disease outbreaks from previous centuries. For many years Pasadena Water operated a liquid chlorination plant at its diversion facilities in the Arroyo Seco Canyon, but that plant became redundant in 1970 when the John Behmer Treatment Plant was constructed.

The Safe Drinking Water Act, enacted in 1974, was the major milestone in the history of US drinking water quality regulation. It established a process of identifying the most significant water pollutants and of enacting legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. Pasadena maintains its own drinking water quality laboratory to ensure that its water meets and exceeds all relevant standards.

Nestled on a mesa on the east side of the Arroyo directly east of Jet Propulsion Laboratory, the Behner Plant was a five million gallon per day conventional water treatment plant, which included chlorination, filtration and a series of other processes to treat the stream flow that Pasadena diverted from the Arroyo stream. The Behmer Plant was closed in June 1993 as the result of new water quality standards. Arroyo stream flow is now routed directly to the series of spreading basins on the east of Hahamongna Watershed Park where it percolates into the Raymond Basin aquifer.

In 1979 traces of contamination were detected at the wells in the Devil's Gate area. Rocket testing in the Arroyo Seco dating back many decades had left a toxic legacy of industrial solvents that had seeped into the groundwater. Nearby wells were promptly closed while Pasadena tested new and innovative treatment methods. In 1990 Pasadena installed a treatment plant that used a closed aeration system and granulated activated carbon to eliminate all traces of the Of

the volatile chemicals. The detection of significant levels of perchlorate, a fuel accelerant in the Arroyo Seco near the present day Jet Propulsion Laboratory (JPL), led to the closing of several more wells in 1997. The National Aeronautics and Space Administration (NASA) has now completed the cleanup of the most severely contaminated pits on the JPL campus and has financially supported the removal of the pollutants from contaminated groundwater. In 2011 PWP General Manager Phyllis Currie and Pasadena water officials opened a $3.5 million perchlorate removal facility at Windsor Reservoir on the eastern edge of Hahamongna. Negotiations are continuing for the construction of a similar facility at Sunset Reservoir near the city yards. All of this has been done with a primary focus on public health and neighborhood involvement.

PWP puts a great deal of emphasis on proving high quality and healthy water to its customers. PWP staff monitors and tests its product regularly to guarantee that Pasadena water always meets or exceeds federal and state standards. Each year PWP issues an Annual Drinking Water Quality Report to assure its customers that stringent testing and tough water quality guidelines are met.

Resource Management and the Challenges of the Future

Drought has been a powerful teacher for Pasadena. It was the drought of 1898 that led to the establishment of the municipal Water Department, and periodic droughts since then have stimulated new efforts to better manage our water supplies. We still experience severe droughts, most recently from 2007-2009, but now we have regional support and cooperation from the other cities and water agencies of Southern California through the Metropolitan Water District to help us deal with the harsh effects of drought.

For many years Southern Californians thought that imported water would be the ultimate solution to our perennial dry conditions and steadily growing population. Now, faced with the threats of earthquakes, court-ordered pumping restrictions due to environmental concerns and escalating energy prices, we know that each of the imported water supplies coming into Pasadena and Southern California is increasingly costly and unstable. As Pasadena Water & Power enters it's second century, we have a renewed understanding of the value of conservation, efficiency and local water resources to create a sustainable water future for our community.

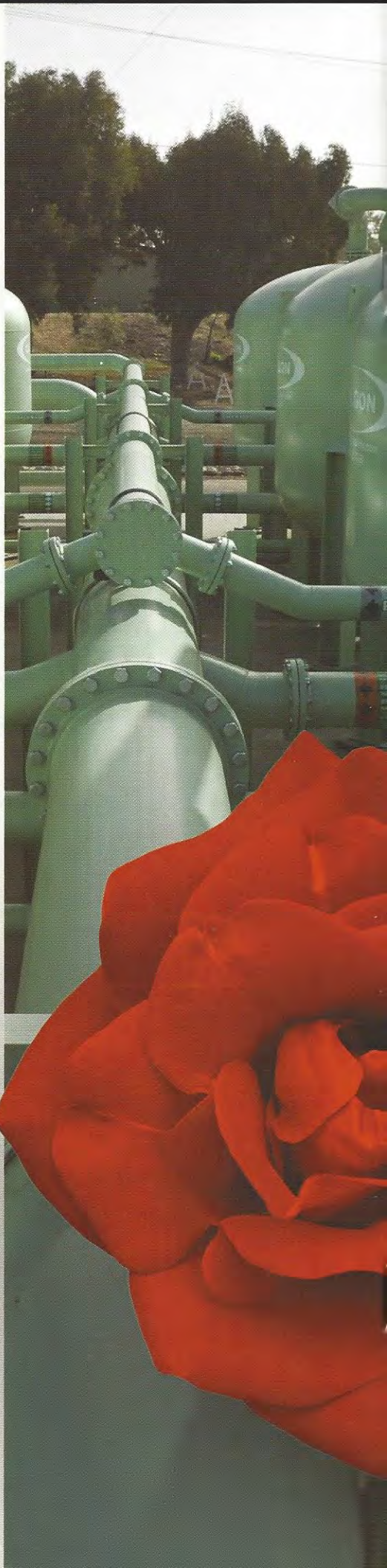
The drought of the late 1980s and early 1990s brought a major change in water planning. No longer is conservation viewed as an emergency measure for the late stages of a drought. Now PWP has incorporated water efficiency as an essential element of the supply portfolio. PWP offers education programs to encourage wise water use and California-Friendly landscapes as well as rebates for water conserving devices such as high-efficiency washing machines and irrigation controllers. During the drought of 2007-2009, Pasadena developed new ordinances to eliminate wasteful practices and refined its tiered price structure to promote efficient use of water. The response from PWP customers has been terrific, surpassing every expectation.

Today PWP has more than 38,067 meters, 500 miles of pipe, 14 storage reservoirs, 16 groundwater wells, and 160,000 customers. Currently, PWP is in the midst of replacing or rehabilitating approximately 230 miles of pipelines built before 1945, performing a seismic study of the reservoirs, and upgrading pumping stations. PWP has its own water quality lab that regularly tests its water citywide to ensure a safe, reliable supply of water.

With recent concerns about supply shortfalls, climate change and predictions of long-term drought, the challenges for Pasadena Water today are different than in the past. In recent decades Pasadena has received about sixty percent of our water from imported supplies and forty percent from local supplies. Now to meet the challenges of the future PWP has crafted a comprehensive water facilities and resources program for the future. The Water System Master Plan, adopted in 2002, reviewed local distribution and storage facilities and developed a program to maintain and upgrade them for the future. The Water Integrated Resources Plan (WIRP) of 2011 is Pasadena's blueprint for ensuring reliable, cost-effective, and environmentally responsible water supply for the next 25 years. A comprehensive and coordinated strategy, it incorporates current and alternative supplies, demand forecasts, climate change and conservation and will expand our reliance on local water resources and conservation to sixty percent.

The Water Integrated Resources Plan Objectives:

- Provide a reliable water supply
- Maintain affordability, while addressing fairness and equity
- Ensure safe, high-quality drinking water
- Protect receiving waters and the environment
- Protect cultural and recreational resources
- Maximize efficiency of water use
- Maintain quality of life and positive economic climate
- Reduce risk and maximize opportunities
- Ensure public safety
- Reduce energy footprint for water operations



PWP puts a great deal of emphasis on proving high quality and healthy water to its customers. PWP staff monitors and tests its product regularly to guarantee that Pasadena water always meets or exceeds federal and state standards. Each year PWP issues an Annual Drinking Water Quality Report to assure our customers that stringent testing and tough water quality guidelines are met. Another key priority for the Department is upgrading the pipes and facilities that have served Pasadena residents well during the last 100 years

A Heritage to Celebrate

Pasadena's water planners and political leaders have always had the foresight to plan for the future in both infrastructure and water supply. They planned for and built a robust storage and distribution system. They tapped diverse resources to ensure a reliable supply of water. Pasadena has also been in the forefront in regional water planning. This tradition of excellence and leadership has been carried on through the past ten decades up to today. Now the Master Plan and Integrated Water Resources Plan provide the roadmap to a sustainable future.

Pasadena Water & Power is a community enterprise that has always provided vision, leadership and customer-responsive service in the development of safe and reliable water for the health, economy and quality of life of our community. In this centennial year, its proud heritage can be shared and should be celebrated by all the residents of Pasadena. We salute the men and women of Pasadena Water who have made such a singular contribution to our community.

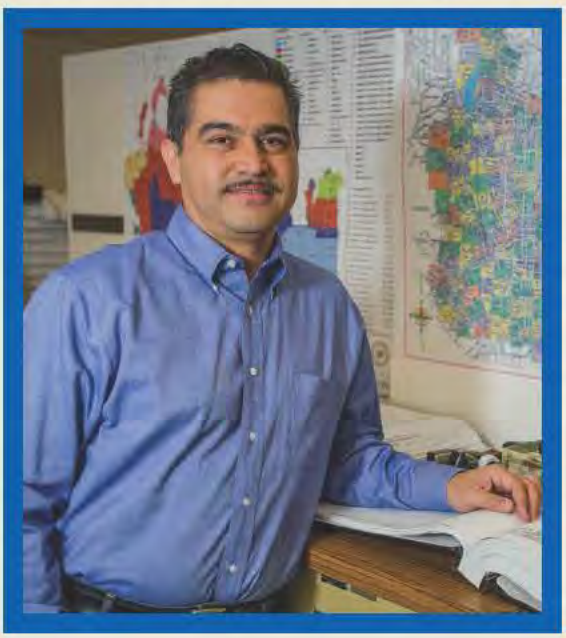
Pasadena Water Department

There are more than 200 people who expertly plan and care for the city's essential water services on a daily basis. Here are just a few of the people committed to ensuring that your water is reliable and safe.

PASADENA
Water&Power

The Engineering Section handles the complicated technical planning required to ensure a reliable, functioning water delivery system, dependable fire protection and a clean, non-stop water supply for everyone in Pasadena. A total of 27 engineers, chemists, construction inspectors and engineering aides work in four specific groups: Distribution, Facilities, Supply and Water Quality.

The Distribution Group is in charge of Pasadena's complex water delivery system, which includes thousands of pipes, valves, fire hydrants and water meters. There are more than 500 miles of pipelines delivering water beneath the city, and more than 200 miles of them are 70 years old and older. Our Distribution team runs an aggressive program to replace these aging pipes to ensure reliability, adequate water pressure and fire protection for our customers.



Aldolfo Vargas was raised on Pasadena water, making his way from Longfellow Elementary School to Elliot Junior High to Muir High School to the Engineering Department of Cal State Los Angeles. Now a PWP associate engineer, Vargas helps to make sure Pasadena's water distribution system will serve many more generations to come.

Working with a team of five, he writes, processes and tracks specifications, contracts and purchase orders for materials, equipment and labor to make sure all improvements are made to PWP's standards. He prepares work orders, estimates and plans for installing new water mains, and coordinates with PWP's field staff and road-paving crews to make sure all work is done on time, under budget and as designed.

"Being part of the process that provides safe, drinkable water to the community is very important," he said. "When you think of places where water isn't readily available, or water is plentiful but the community can't drink it because of the contaminants it has, we have a feeling of great achievement every day."

The Facilities Group ensures that the city's water facilities, including 14 reservoirs, 16 groundwater wells and 19 booster pump stations, are in top shape. Many of these facilities were built in the 1920s and 30s. The Facilities team is steadily replacing or upgrading these aging structures to make sure they're working well and seismically safe.

"We have a feeling of great achievement every day."
-Adolfo Vargas

"Our work makes a difference."
-Roumiana Voutchkova

The Resource Planning Group manages Pasadena's water supply. They determine when and how much water we need to pump or import to meet customers' needs at a reasonable cost. Our supply team works closely with the Metropolitan Water District of South California, which provides imported water from the Colorado River and Northern California, and the Raymond Basin Management Board, which oversees local groundwater. They build water treatment facilities to make sure Pasadena can use as much groundwater as possible, and they plan for new water supplies, such as recycled water and storm water runoff.

PWP Engineer Roumiana Voutchkova spends her busy days approving studies, designs and environmental documents, securing state and federal grants and coordinating construction with inspectors, contractors, design engineers, other city departments and state and federal government officials to make sure PWP's water supply projects meet the highest of standards. Her mission is to help PWP meet growing demand and cut its reliance on expensive imported water by maximizing existing local water supplies and developing new local sources.

In the past year, Voutchkova and her team have laid the groundwork for an innovative plan to irrigate Brookside Golf Course and, later, other public properties citywide with recycled water, eventually saving millions of gallons of drinking water each year. The team is now devising a way to infuse this system with groundwater that has been flowing through tunnels under Devil's Gate Dam for decades, flushing out to sea. "It works well as part of the recycled water program," Voutchkova said.

Also working well is PWP's new Monk Hill Water Treatment Plant, in which Voutchkova played a key role by managing the design and construction of the disinfection facility. The treatment plant, funded by NASA, treats up to 7,000 gallons of groundwater per minute, removing decades-old rocket fuel and allowing Pasadena to reopen four long-closed wells. Voutchkova's team is now working with NASA on determining who is responsible for the cleanup of five contaminated wells near Pasadena's Sunset Reservoir.

"Our work makes a difference," said the 10-year PWP veteran. "If we do our work well, our rates won't be increased as often and the people of Pasadena will have a reliable water supply."

The Water Quality Section makes sure Pasadena's water is clean and safe. This team performs nearly 30,000 tests every year, on a daily, weekly and monthly basis, to safeguard water quality for our customers. Most of these tests are performed at PWP's own water quality laboratory. This team also monitors changing state and federal regulations for drinking water quality and certifies that Pasadena's water meets all standards.

Mary Yamashiro, a 38-year city employee, heads the microbiology section. After spending her childhood reading at Pasadena Central Library, window shopping along Colorado Boulevard and studying at Washington Middle School, Yamashiro joined the city's Health Department as a public health microbiologist and laboratory coordinator. Proving herself as an expert, she was tapped in 1994 to create an in-house microbiology lab for testing and treating Pasadena's water quickly and efficiently, without relying on outside agencies. Including the lab's organic section, this in-house testing saves PWP thousands of dollars each month on work that was previously sent to outside labs.

Now known throughout the state and country, "I continue to work (after nearly 40 years) because I enjoy what I'm doing," Yamashiro said. "I was trained in public health, and I was trained well. As a public health microbiologist, the health and safety of the community and quality control in the laboratory are my primary professional goals. We have a 'class A' operation, and I am proud to be a part of it."

Out in the field, Water System Operator Ben Mitchell uses the computerized SCADA system to constantly monitor and adjust PWP's reservoir levels to make sure they're not

"We have a 'class A' operation, and I am proud to be a part of it."
-Mary Yamashiro

"I always try to make sure the customer's happy."
-Ben Mitchell

too high or too low. He carefully blends local groundwater with imported water to just the right ratio, adjusts chlorine levels ("the best available technology for keeping water clean,") and watches vigilantly for any unusual odors, colors, cloudiness or other problems. "When two different types of water mix," he explains, "they don't always like each other."

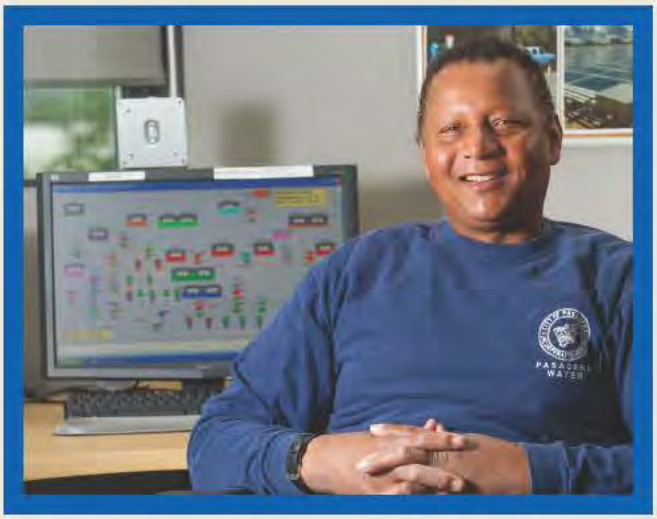
Dispatched from the City Yards, Mitchell and his colleagues drive out to locations throughout Pasadena to draw hundreds of water samples every month to be analyzed back at the lab, all under the direction of the California Department of Health. "If we don't take the classes and pass the test," he said of his specialized state certification, "we'll be out of a job."

With dozens of duties on his schedule, his favorite is visiting customers to listen to their concerns and to fix any water-quality problems. "When I leave I always try to make sure the customer's happy," he said. "I know a lot of people say that, but we really do go out of our way to make sure customers have pleasant-tasting, aesthetically pleasing water 24/7."

"My job is different on a daily basis."
-William Jordan

The Water Production Section

operates and maintains PWP's water storage, water treatment and water pumping facilities to provide adequate water supply for residents and businesses in the city. The water treatment facilities assure a safe and potable water supply throughout Pasadena. Hundreds of water samples are collected every month to make sure water quality goals are achieved.



In his nine years with PWP, Water System Operator William Jordan has had his eyes and his hands on every corner of the system. He's one of five operators who monitor PWP's computerized tracking system, SCADA, non-stop through weekends, holidays and windstorms. He gathers water samples for testing, summons more water from MWD or turns on wells to replenish dwindling reservoirs, meets with customers and regularly visits Pasadena's 35 chlorination stations to make sure there are no leaks. He chlorinates brand-new water mains, testing them twice over 24 hours to make sure the water is absolutely safe for consumers.

With his hardhat and toolbelt in place, he and his crew work diligently to keep PWP's water facilities in top shape, installing doors and replacing windows, painting aging well houses, changing oil and adjusting and repairing the pumps that draw groundwater and transfer water to Pasadena's reservoirs. He responds quickly to equipment problems and, once a year,

Jordan takes the wheel of a V6 Cat bulldozer to till the soil at PWP's settling ponds at the mouth of the Arroyo Seco to make sure mountain runoff percolates into the groundwater basin.

Jordan reports that he loves the variety and his opportunity to serve the community. "My job is different on a daily basis," he said. "There's always something new or a special project to improve the system, so I never get bored."

Growing up in Pasadena, PWP Caulker and Lead Repair Mechanic Doug Ross "didn't know what it took to get the water to my sink or to wash my car," he said. "I didn't know where it comes from and why."

Today, still relying daily on the math and chemistry he studied at Muir High School, Ross has learned the "A to Z of water," and he holds two state certificates proving his expertise in water treatment and distribution. On any given day, you'll find him hauling 150-pound chlorine cylinders, flushing out water mains, drawing and analyzing water samples, fine-tuning disinfectants, repairing faulty booster pumps or scrutinizing PWP's computerized control system for any problems – all to make sure water makes it to Pasadena's taps.

A recent thrill was helping to open the Monk Hill Treatment Plant near the Jet Propulsion Lab, which relies on state-of-the-art technology Ross and his crew – and most of the world – had never before seen.

"I love being outside, using my hands, using my head to figure things out, sometimes a little muscle here and there," said the PWP veteran, who's studying at Citrus College to secure advance certifications. "My job is challenging," he said, "but it gives me the motivation to learn even more."

"My job is challenging, but it gives me the motivation to learn even more."
-Doug Ross

The Construction Section

are the chief "mechanics" for Pasadena's water distribution system. Four crews work daily repairing and maintaining pipelines that range from 4" to 24" in diameter. They also work on individual service lines, from ¾" to 12" in diameter, that run from the main pipelines in the street to homes, businesses and fire hydrants.

Field Crew Supervisor David Jones has spent 33 years attending to this vast underground network to make sure water makes it quickly, safely and with adequate pressure to every meter and hydrant. In addition to steadily working on PWP's multi-million dollar master plan to replace 230 miles of aging water mains – some as old as 100 years – Jones

"The biggest challenge is to achieve permanent changes in the way Pasadena uses water."
-Nancy Long

and his crew complete scheduled maintenance, respond to customer concerns and rush out to make emergency repairs. (One of his most memorable days was Christmas Eve a few years ago, when a 107-year-old cast-iron Colorado Boulevard water main that had never shown a hint of problems burst a week before the Rose Parade, sending a flood into a nearby shop. PWP made the repairs in record time.)

"It's a challenge to try and educate people when an incident does happen that there's not always someone at fault," Jones said. While PWP runs an aggressive maintenance program, "nothing works forever. It's simple physics. Whether it's your car, your body, your refrigerator, your plumbing, everything takes some type of maintenance, sometimes with no prior warning."

A skilled, experienced technician, Jones takes pride in completing projects quickly and efficiently, minimizing disruptions to customers.

The Water Conservation Section runs a

comprehensive program of workshops, incentives and water-waste education campaigns to encourage the efficient use of water and to teach customers about the importance of conservation. The mission is to cut waste and reduce our city's reliance on expensive imported water. This team also makes sure Pasadena follows all local, state and federal water-use regulations and best management practices so that the city meets its conservation goals and continues to receive grant funding in the future.

"The biggest challenge is to achieve permanent changes in the way Pasadena uses water," said Water Conservation Manager Nancy Long. "When we have a rainy year, we want to make sure customers don't feel as if water conservation is no longer necessary. Water supply issues are a long-term challenge not only for Pasadena, but for the entire state and around the world."

To help customers conserve nearly painlessly, Long and her team offer a long list of rebates for turf replacement and water-saving equipment, most targeted at the outdoors.

"The coolest part is watching the landscape in Pasadena transform from rolling green thirsty lawns to California Friendly landscapes that are not only beautiful but use half the water," she said. "By providing incentives to replace turf with native and drought-tolerant plants, PWP is helping to take Pasadena back to its natural roots."

PASADENA
WATER CENTENNIAL
100
YEARS
1912 = 2012

CELEBRATING 100 YEARS

OF MUNICIPAL WATER SERVICE

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