

Q&A

On Recycled Water Issues

Can drinking recycled water cause health problems? Could viruses, including HIV and AIDS, be transmitted in recycled water?

For many years, citizens of Southern California have used water resources with little attention to conservation. Millions of gallons of water per day flow into the ocean as water streams pass through Southern California or are dumped as a byproduct of waste production and elimination.

Water reclamation projects offer a safe way to preserve our natural water resource. There is no evidence to support the fear that human or animal disease can be associated with the use of reclaimed water. The processing of reclaimed water which is then used to recharge the groundwater table produces a water product that is many times more pure and free from contaminants than water which soaks into the ground after a rain or through runoff from the multiple uses of water in the Southern California area.

I have been asked again and again whether reclaimed water can spread diseases like AIDS or tuberculosis. The answer is clearly, NO. Neither of these diseases are waterborne or associated with water contamination.

The water reclaiming process produces a water product that is free of pathogenic organisms. The filtering of the water through many feet of clay, sand, or other types of soil adds even more filter power to an already safe-to-drink product.

We need to quit stretching our imaginations to the outer limits and get down to the business of preserving one of our most precious assets, water. Nature has been reclaiming water for eons and much more crudely than our present technology allows us to do. As we enter the 21st century, let us get real and exploit reclaimed water to the greatest extent possible.

SHIRLEY FANNIN, M.D.
*Director of Disease Control Programs, Los Angeles County,
Department of Health Services.*

INSIDE THIS ISSUE

Leading reclamation and reuse professionals address health and safety, aesthetics, water quality and economic issues of recycled water uses in this question and answer issue. Among the contributors are:

Shirley Fannin, M.D.,
director, Disease Control Programs, Los Angeles County;

Earle C. Hartling,
water reuse coordinator, Los Angeles County Sanitation Districts;

Clint Granath,
vice president, Forest Lawn Memorial Parks; and many more.....

Health & Safety



Hoover Ng

With anything new there is a certain amount of misinformation that influences whether a concept or technology is accepted. Conflicts arise and political lines are drawn. We have seen this scenario repeated time and again in the water world. For example, in recent weeks, there have been discussions recounted in the press about water fluoridation. Supporters argue that adding fluoride to public drinking water supplies helps to prevent tooth decay, pointing to documented results in other parts of the country.

Opposing forces fear health risks, claim mandatory fluoridation takes away freedom of choice and may contribute to more bottled water sales. Some water agencies believe that fluoridation treatment may complicate other drinking water quality goals and requirements. Added to this discussion is always the question of cost and who pays.

There are similar issues concerning recycled water treatment technology and usage. Recycled water use can spur negative reactions from people. Valid questions arise in connection with reliability of the treatment technology, safety, public health risks and economics. In this issue of *L.A. Water ReNews*, we address some very important questions about recycled water including treatment, safety, economics, quality, uses and research to dispel misconceptions and bring our readers up-to-date on the latest water recycling information. The questions are answered by current recycled water users and experts in the fields of water recycling technology, health, regulations and the environment.

In the water business, we know that there is a limited amount of water on the Earth, and it has been used over and over again since time began. We are faced everyday with the dilemma of planning for future water needs and knowing how to safely and efficiently recycle to increase supplies while meeting increasingly stringent federal, state and local regulations. Today, the public is more environmentally aware. They hear our messages and conserve water. Such awareness has reaped benefits both on the economic and environmental fronts.

Public acceptance of water conservation came about because of a shortage of resources, droughts, increased demand and rising costs. And, water recycling is becoming more widely practiced because of the same reasons in addition to changing environmental policies and values.

Our customers will need to be more comfortable with recycled water. We'll ask them to accept the use of recycled water as an integral part of their water supply mix. Recycled water can be used in a variety of ways. Perhaps most important is groundwater recharge. To move forward, we need to build confidence by sharing accurate information, and not be misled by misconceptions and unfounded half-truths.

Let us know if we have missed an area of importance to you, and we will include it in future issues. Your input is important to us.

Wishing all our readers a happy, healthy and peaceful holiday season.

CALENDAR

Water Reuse 96

Feb. 25-28, 1996
Sheraton Harbor Island
San Diego, CA
Information call
AWWA (303) 347-6181

Disinfecting Wastewater for Discharge and Reuse Conference

March 17-20, 1996
Portland, Ore.

Information and brochure call:
Patricia Hayden, (703) 684-2414
FAX on demand: (800) 444-2933
Internet #: P.Hayden@WEF.ORG
Water Environment Federation

CORRECTION

A humble apology to the directors and staff of the Central and West Basin Municipal Water Districts for the omission of their organization in a chart featuring recycled water "players" in Los Angeles County included in the October special issue. The intent of that chart was to provide a legend-of-sorts detailing facts about the water agencies that were involved in groundwater recharge issues. Central and West Basin Municipal Water Districts should be acknowledged as a leader in our region's development of water reuse.

Can water reclamation technology and monitoring programs really be trusted to protect public health? How reliable is the technology?

Water reclamation treatment plants protect the public health when designed and operated to consistently comply with appropriate performance standards, and when they incorporate mandated reliability features. The California Reclamation Criteria in the California Code of Regulations Title 22 specify proven treatment technologies and appropriate performance standards for various reclaimed water uses. Compliance with the performance standard for a technology, as demonstrated by an approved monitoring program, will ensure that the risk from exposure to pathogenic microorganisms does not exceed safe levels. The treatment technologies allowed have demonstrated the ability to effectively and reliably produce a safe reclaimed water. As an additional safety feature, plants are required by the Reclamation Criteria to have reliability features such as standby equipment and flow diversion capability.

ROBERT HULTQUIST

*Senior sanitary engineer, California Department of Health Services,
Office of Drinking Water.*

Yes, public health will be protected. Every wastewater treatment facility is governed by effluent discharge water limitations designed to reduce biological and chemical constituents to acceptable levels. When water reclamation is the objective, additional treatment and stricter standards are required, as described in the state Department of Health Services' Title 22 Wastewater Reclamation Criteria. The primary concern with reclaimed water use is the minimization of public exposure to certain viruses. Water reclamation plants usually employ a treatment train consisting of secondary treatment followed by chemical coagulation, sedimentation, filtration, and disinfection to 2.2 MPN/100 ml, which produces an effluent free from detectable viruses.

Reliability of the treatment process is another obvious concern. Design and operational considerations are included in the Title 22 Criteria. A flexible design will provide redundancy of process storage, pumps, and other critical equipment. Add to this, alarm devices on most equipment, instrumentation with automatic control devices, a back-up power supply and provisions for uninterrupted chlorine feed, and you will begin to understand the extensive measures utilized to ensure reliable treatment. The human factor also is important. Properly trained and certified operators run the plants to ensure production of high-quality water.

ROBERT KRIVAK

Assistant plant manager, Los Angeles' Donald C. Tillman Water Reclamation Plant, Van Nuys.

WATER RECLAMATION LEGISLATION

Bill No.	Author	Brief Description	Status
SB128	Kelley	Local SRF Match	Law
SB 179	Kelley	Water Reuse Institute	Law
SB 172	Beverly	Residential Dual Plumbing Demonstration Project on Avalon	Law
AB 313	MacDonald	Gray Water	Law
AB 125	Rainey	Institutional Rearrangement for Sale of Reclaimed Water	2-Year Bill
AB 1247	Setenchich	"Reclaim to Recycle"	Law
SB 1304	Mountjoy	Elections Required for Groundwater Recharge with Reclaimed Water	2-Year Bill
AB 363	Cannella	Water Rights	2-Year Bill

Is there a risk of groundwater/surface water being contaminated from the introduction of recycled water?

Indirect potable reuse projects, those that introduce recycled water into either a groundwater supply or a surface water impoundment, must adhere to stringent regulations imposed by federal, state and local health officials. These regulations prescribe multiple layers of protection for both the environment and public health, ensuring that the introduction of recycled water into a community's water supply is as safe as the existing supply of that community. As a testament to the effectiveness of these stringent regulations, comprehensive health effects and water quality studies have demonstrated the safety of recycled water being introduced into groundwater and surface water supplies in a variety of settings throughout the country.

PETER MACLAGGAN, P.E.

Director, Water Reclamation, San Diego County Water Authority.

Groundwater recharge criteria in California have been established to provide extra measures of safety for the use of recycled water to ensure that public health is protected. The recycled water must remain within the groundwater table for at least six months, and must travel at least 500 feet horizontally prior to being extracted by domestic production wells. Furthermore, water produced at any domestic well cannot contain more than a specified maximum percentage of recycled water. In the case of the East Valley Water Recycling Project, proposed by the city of Los Angeles, the recycled water will remain in the ground for approximately five years and will travel over one mile prior to being extracted by a domestic production well.

Recycled water has been used for groundwater recharge for over 30 years as part of the Whittier Narrows Groundwater Replenishment Project with no measurable impact on either groundwater quality or human health.

WILLIAM T. VAN WAGONER

Engineer, DWP, Water Resources Section - Reclamation Group.

If recycled water is blended directly with stored surface and groundwater supplies, is there a risk of contaminating water supplies with recycled water?

It is possible to treat recycled water to any desired quality. In the last 25 years, numerous scientific papers reviewing recycled water uses have stressed appropriate treatment for each intended use. For example, in 1971 a technical report sponsored by the World Health Organization suggested recycled water treatment processes to meet health criteria for various types of water reuse, including direct human consumption. With appropriate treatment, adequate treatment system reliability and comprehensive water quality monitoring, recycled water can be blended with other waters for direct use with no greater risk than other currently used sources.

JEFF HELSLEY

Assistant general manager, Water Replenishment District of Southern California.

Aesthetics

Does recycled water smell and look different than tap water?

In a word, "NO." Recycled water is the end product of a three-stage treatment process in which municipal wastewater is settled out, biologically oxidized, clarified, chemically coagulated, filtered and disinfected. The resulting water is clear, colorless, odorless and is virtually indistinguishable from tap water to the human senses. Beyond what the senses can perceive, the recycled water does not contain any constituents that exceed federal and state drinking water standards for heavy metals, minerals, trace organic compounds, pesticides, microorganisms or radionuclides. And for those of us at the treatment plants who have taken sips of the water, it doesn't taste any different either.

EARLE C. HARTLING

Water reuse coordinator, Monitoring Section, County Sanitation Districts of Los Angeles County.

Water Quality

How does the quality of storm water runoff compare with reclaimed water?

As you can imagine, storm water as it washes the city landscape naturally picks up many polluting chemicals from the streets, industrial and commercial areas and even residential communities. Storm water in this form can be very polluted, especially the “first flush,” and is the concern of many regulatory agencies responsible for improving water quality. Management practices are being put in place to prevent chemicals from being washed away with the storm water, but these controls are new and untested.

Urban storm water could be a source of water supply. Los Angeles County Public Works Department is studying the feasibility of capturing and using storm water runoff at the mouth of the Los Angeles River. The capturing of the first flush discharges, however, must be avoided. Storm water is currently being dammed and allowed to filter through the soil to recharge deep groundwater aquifers in the San Gabriel and Rio Hondo River systems for eventual use as water supply.

DAVID TALCOTT

Assistant division engineer, city of Los Angeles, Department of Public Works, Bureau of Engineering.

The average person might presume that reclaimed water would be of poorer quality than storm water. This is not true. Reclaimed water for widespread use meets drinking water standards. Its biological and chemical constituents are more predictable than urban storm water.

Today's purification and monitoring processes in water reclamation plants ensure a consistently high level of quality in reclaimed water, whereas the quality of storm water is not monitored nearly as rigorously and can vary greatly depending upon the time of year or the course it takes to reach its collection destination. When the quality is acceptable, storm water is frequently used to recharge groundwater basins.

HOOVER NG

Engineer, DWP, Water Resources Section-Reclamation group.

Can recycled water be used to irrigate sensitive landscape areas like cemeteries?

In regard to cemeteries, the answer is a resounding YES! Of the five Forest Lawn Memorial-Parks in Southern California, three — Forest Lawn-Hollywood Hills, Forest Lawn-Glendale and Forest Lawn-Long Beach — have been irrigated with recycled water (for a total of 385 irrigated acres). Its use, measured over as much as a period of six years, has been highly successful. In fact, use of recycled water in one respect is like having a built-in liquid-born-fertilization system. The only potential drawback, as with any component of the landscaped environment, is that recycled water must be managed carefully to avoid problems associated with under or over application, such as toxicity, and excessive plant and grass growth, which require more mowing and trimming.

CLINT GRANATH

Vice president, Architectural and Engineering, Forest Lawn Memorial-Parks.

And, how about golf courses and ornamental lakes?

Recycled water can definitely be successfully used to irrigate golf courses. Industry Hills' Golf Course is a perfect example. Satsuma Landscape and Maintenance has managed the two, 18-hole golf courses since 1983, and finds that using tertiary-treated recycled water for lakes and irrigation at the golf courses an easy task. Recycled water now nourishes 600 of the 650 acres and supplies water for eight lakes used for recycled water storage, aesthetics and water hazards. The golf course was built on a landfill and retrofitted in 1983 to accommodate the use of recycled water from the San Jose Creek Reclamation Plant, which is operated by the County Sanitation Districts of Los Angeles County.

There are three common problems associated with recycled water and golf course irrigation. They are: adapting the plant life and grasses to the water; maintaining the hypersensitive greens; and lake maintenance. All three problems have been conquered at Industry Hills.

Native Southern California plant life, which is typically hardy and tolerant of high levels of salinity, was planted, and with the exception of the greens, the golf course turf consists of both common and hybrid Bermuda grasses. The greens are a mix of bent and annual blue grass which are not as salt tolerant as the Bermudas, but have adapted well to recycled water.

Greens maintenance problems are tied to native soil conditions, greens construction, local temperatures and water quality. While some stress can be tolerated on fairways, grounds superintendents generally do not want to see any signs of stress on the sensitive and costly putting greens. Industry Hills greens are constructed on 12 inches of sand atop a gravel bed with a herring bone style drainage system. The soil type is loamy clay. Consequently, the drainage is excellent. Stress from excess salinity is minimal.

Even with appropriate drainage, leaching (percolating large amounts of water into the ground to wash the unwanted solids down below the root levels), is required about three to four times annually. A total dissolved solids tester is used on the soil to determine if leaching is necessary. While some superintendents believe

Water Quality

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that potable water should be used for leaching, Industry Hills uses recycled water with success. The additional water used for leaching is not a concern because it only costs \$15 per acre-foot, a price most golf courses can only dream of. The current purchased water price per acre-foot for treated potable water is more than \$400.

Recycled water lakes can cause problems because of high nutrient levels that stimulate algae growth. However, with a trial and error period and a certain amount of determination, this can be overcome. The worst lake problems occur in the summertime when algae growth is stimulated by the warm weather. The more shallow the lakes, the bigger the problem.

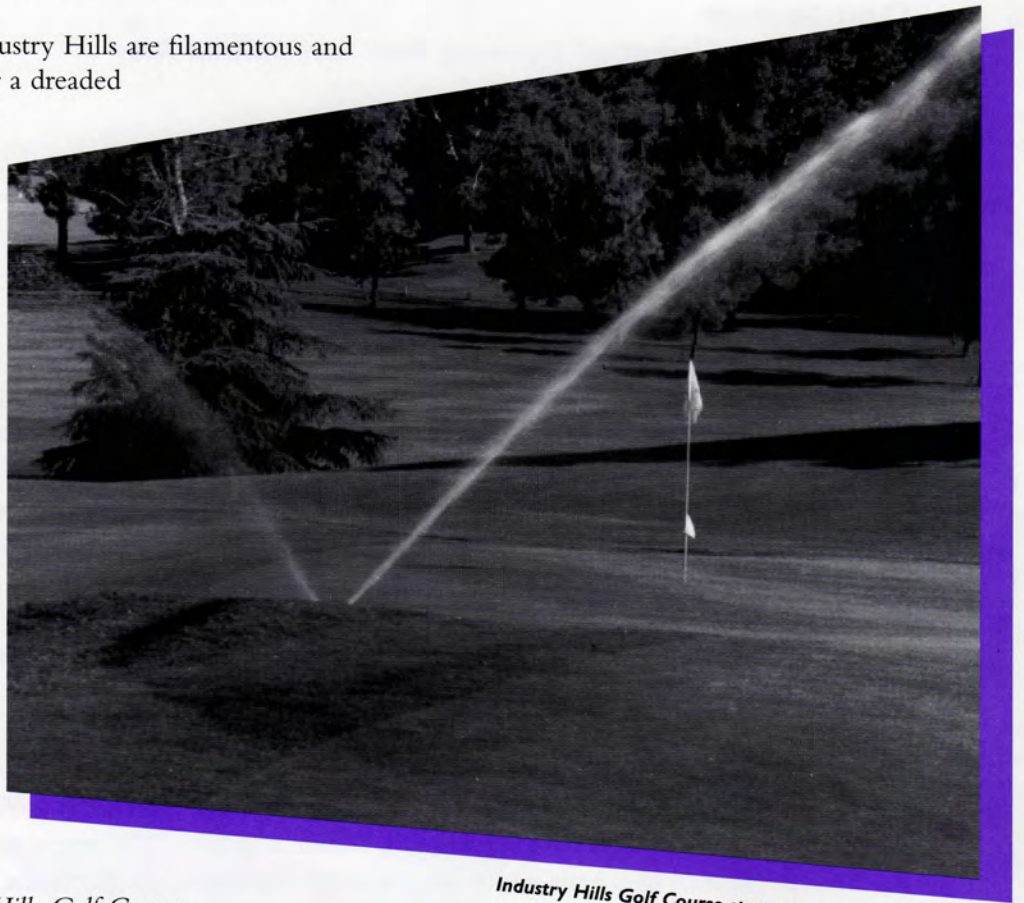
The troublesome algae at Industry Hills are filamentous and planktonic which give the water a dreaded greenish tint. It was found that aeration was not the best way to control algae, and that the best defense was copper treatments combined with coloring agents (designed to block the sunlight) and nutrient-eating plant life such as water lilies. Occasionally, the surface of the lakes must be scraped to remove the filamentous growth.

The continued success of recycled water use seems assured by the positive and forward looking attitude of Satsuma's management and employees. We accept the inevitability of recycled water use, especially for recreational applications in California.

KENT DAVIDSON

Maintenance manager, Industry Hills Golf Course.

(This response taken from an interview with Kent Davidson for an L.A. Water ReNews article.)



Industry Hills Golf Course stays green with recycled water.

How much research has been conducted regarding potential health effects when recycled water is used for groundwater recharge?

In Southern California alone, studies have been conducted, or are proposed, to evaluate the potential health effects of using recycled water for groundwater recharge. Most notable is an exhaustive analysis performed from the late 1970s to the early 1980s. The final report, which was prepared by the Sanitation

Districts of Los Angeles County on behalf of a consortium of agencies interested in water reuse, included analyses on water quality, toxicology, epidemiology, percolation, and other relevant issues to groundwater recharge with recycled water. The study goes on to conclude that, "Extensive evaluation of the Whittier Narrows groundwater replenishment project did not demonstrate any measurable adverse impacts on the area's groundwater or the health of the population ingesting this water."

The Rand Corporation is now completing an epidemiological assessment of using recycled water for groundwater recharge in the Montebello Forebay. This study is an out-growth of the earlier study mentioned above and seeks again to determine if there is any correlation between specific health outcomes and groundwater recharge with recycled water. Again, preliminary results show that even with the increased use of recycled water over the past 10 years, and the added history of health outcomes data, there appears to be no adverse health effects resulting from the use of recycled water for groundwater recharge.

MARIO GARCIA

Engineer, Water Replenishment District of Southern California.

Do treatment methods vary depending on the use of recycled water, i.e., industrial, groundwater recharge, irrigation?

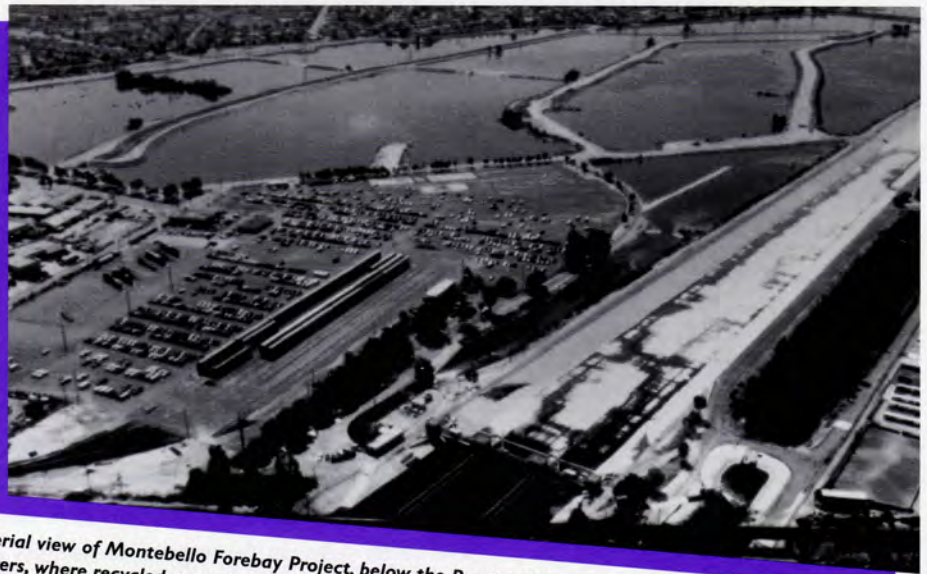
The more intimate the use, the more treatment is required to reduce risks, both real and imagined even beyond what is essential to protect the public health. For example, indirect potable reuse, through injection of recycled water into an aquifer or into a surface reservoir, calls for inclusion of reverse osmosis in the treatment train, while for landscape irrigation and industrial use of recycled water, tertiary treatment is generally deemed quite sufficient. On the other extreme, for uses of recycled water where public contact is assuredly at a minimum, such as flushing sewer lines, irrigating orchards, vineyards and food crops that are commercially processed before human consumption, the lowest treatment levels are adequate.

Some 40 specific uses of recycled water are enumerated in the latest version of the revisions to the California Water Reclamation Criteria. They include 19 types of irrigation, three kinds of applications for filling impoundments, two cooling and air conditioning uses, and 16 other categories of water recycling. Among the newest entries into the "allowed uses" arena are: flushing toilets and urinals in commercial buildings, residential landscape irrigation, commercial laundries, and cooling towers.

The final adopted Water Reclamation Criteria are expected to take effect some time in 1997. However, the state Department of Health Services applies the proposed revisions to new water recycling proposals almost routinely now.

BAHMAN SHEIKH

Water reuse and water resources policies specialist, Central and West Basin Municipal Water Districts.



Aerial view of Montebello Forebay Project, below the Puente Hills at the Rio Hondo and San Gabriel rivers, where recycled water has been used for groundwater recharge for 30 years. (Photo courtesy of Water Replenishment District.)

Economics

Will the use of recycled water in Los Angeles scare away new business?

The use of recycled water in Los Angeles will not frighten new businesses away from the area. In fact, recycled water programs can serve as a positive encouragement for new businesses. While some industry segments have expressed opposition to recycled water, businesses generally have been very supportive of recycled water in Los Angeles. Businesses that have signed on to recycled water programs have saved cities in the region thousands of acre-feet of fresh water and reduced the waste runoff into local lakes, streams and oceans by reclaiming the water that would otherwise be discharged into already threatened ecosystems.

Recycled water is an integral component to future water conservation plans in Southern California. The water recovered in reclamation programs can be used for a variety of uses, from gardening to refining oil. Technology renders recycled water both safe and reliable. Without efforts to reuse the millions of gallons of water Southern Californians use everyday, pressures on our other water resources will intensify. Southern California needs to utilize all available strategies to ensure our long-term water needs are met.

Businesses are cognizant of the vital role water plays in the region's economy. Protecting this role is in everyone's best interest. Without water, Southern California cannot grow, either physically or economically. Limited water supplies restrict growth and inhibit new business development, an economic stagnation which benefits no one.

RAY REMY

President, Los Angeles Area Chamber of Commerce.

Will using recycled water for groundwater recharge have environmental impacts statewide?

Yes, using recycled water for groundwater recharge in Southern California will definitely have positive and long-range environmental impacts statewide.

Until recently, almost half of Los Angeles' water supplies were imported from the Owens Valley and Mono Basin. However, these diversions, caused significant environmental problems in the Eastern Sierra. Recent court decisions as well as agreements negotiated by the city of Los Angeles, now require the city to dramatically reduce its diversions from the Eastern Sierra.

While these actions have put an end to years of conflict, particularly over the future of Mono Lake which will be protected at the higher, healthier lake level of 6,391 feet above sea level, it raises the question: Where will Los Angeles obtain

replacement water supplies? If the city were to turn to Northern California for the replacement water, it could place additional pressure on the already environmentally sensitive San Francisco Bay Delta.

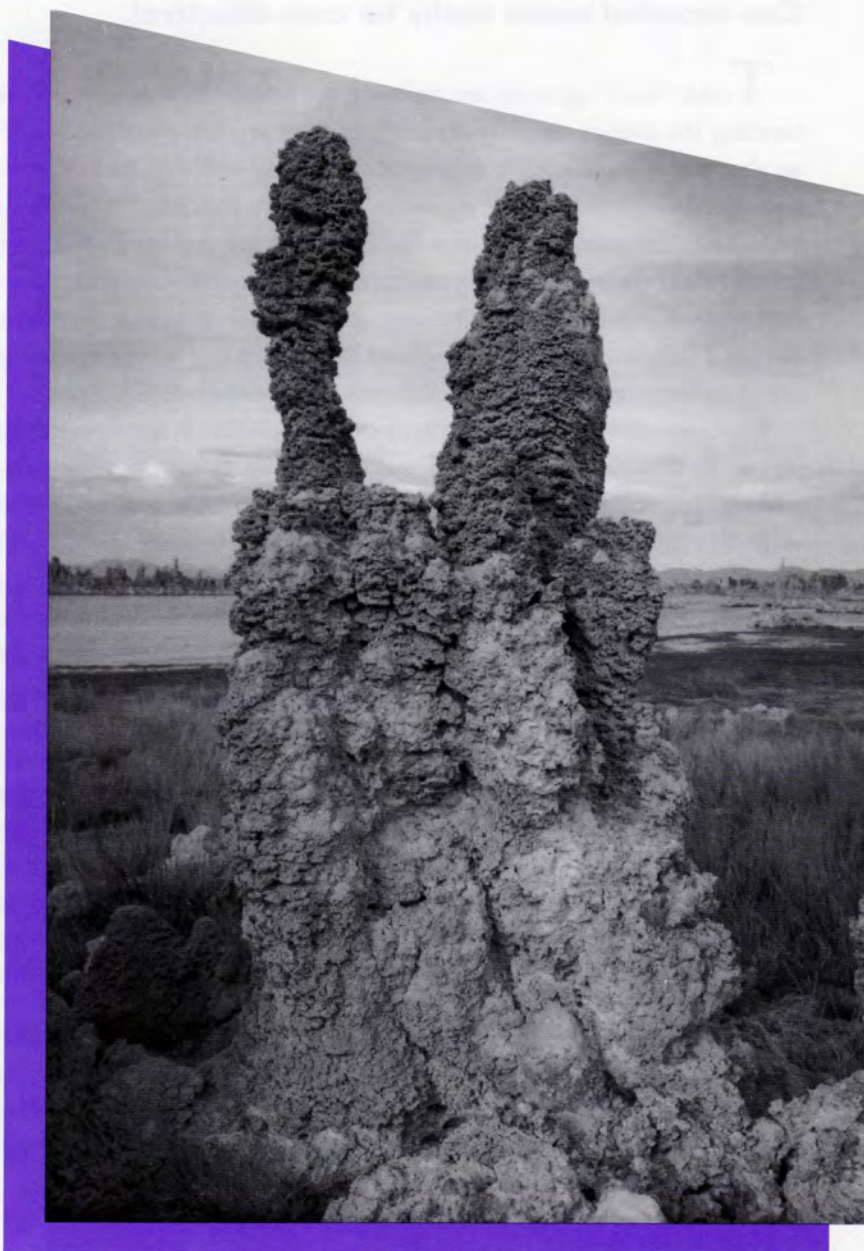
Fortunately, the Los Angeles Department of Water and Power recognizes the importance to our Los Angeles community of planning for future droughts as well as making efficient use of our existing water supplies. To make up for the lost water supplies from the Eastern Sierra and avoid the need to take more water from Northern California, DWP is accelerating implementation of several major water recycling projects. The cornerstone project is the city's East Valley Water Recycling Project which will ultimately provide 35,000 acre-feet per year of water for groundwater recharge in the San Fernando Groundwater Basin.

Utilizing recycled water in Los Angeles and throughout Southern California for groundwater recharge will ultimately provide our community with a more reliable, "drought-proof" and economically valuable supply of water. In addition, by decreasing our demand for imported water, be it from Mono Lake, the Owens Valley, the San Francisco Bay Delta or other regions of our state, we can protect the health and beauty of our environment.

Mary Jane Foerster, member of the state Water Resources Control Board, recently commended the city of Los Angeles for its decision to develop the East Valley Project as the replacement supply for Mono Lake, calling it "one of the best examples of meeting an environmental need with recycled water." We agree.

MARTHA DAVIS

Chairperson, Mono Lake Committee.



Tufa towers at Mono Lake are formed when calcium from fresh water springs combine with the carbonates of salt water and precipitates.

Can recycled water really be cost-effective?

Today, water agencies are realizing the importance of recycled water in meeting the ever-increasing demands of their service area. Recycled water is an alternative water supply to augment existing water supplies that must be equally considered in water resources planning. Recycled water is currently being used for non-potable uses such as landscape and agricultural irrigation, groundwater recharge, and commercial and industrial purposes. Use of recycled water for industrial applications and seawater intrusion control is generally on a continuous basis throughout the year, while irrigation and groundwater recharge applications are seasonal and weather-dependent.

The cost-effectiveness of a recycled water project is site-specific and varies. To determine the cost of water recycling, the costs of facilities required for collection, treatment, and disposal of wastewater to meet the waste discharge requirements should be excluded because they would be incurred regardless of project implementation. The cost of recycling greatly depends on the amount of additional treatment - if necessary, distribution, and environmental and regulatory monitoring requirements. In addition, there is usually a significant energy cost for pumping in hillside areas.

The cost of recycling is influenced by the amount and type of use as well as the distance of customers from the treatment facilities. In an ideal situation, major landscape and industrial customers would be located nearby the treatment plant, minimizing the need for expensive pipelines and pumping operations. Using recycled water to supply existing groundwater recharge facilities is usually cost-effective because large amounts of recycled water can be used at relatively modest cost. Because of economies of scale, a regional water recycling project may be more cost-effective than several smaller projects serving the same service area.

Water recycling projects must be shown to be cost-effective when compared to other water supply options. As reliability and availability of existing water supplies decreases and the marginal cost of producing additional water increases, water recycling becomes a more attractive alternative for supplementing the existing water supplies.

RAY MOKHTARI

Engineer, Metropolitan Water District of Southern California.

Economics

Can industry benefit from using recycled water?

As current users of recycled water, the Chevron Oil Refinery, the Mobil Oil Refinery, Tuftex Industries (a carpet dyer), Robertson's Ready Mix and Paramount Ready Mix, will all say YES.

The economic benefits are obvious. These businesses save an average of 20 to 30 percent over potable water rates by using recycled water provided by the West and Central Basin Municipal Water Districts.

Traditional water supplies, such as imported water, can no longer be relied upon in Southern California. As our ability to import water from Northern California is made more difficult due to regulatory and environmental constraints, alternative sources of water become increasingly important to maintain a viable business atmosphere. This observation is confirmed by a recent study conducted by the Los Angeles Area Chamber of Commerce, which estimates that a 30 percent reduction in water supplies to large water-using industries in our area could result in a loss of about \$8 billion and 26,000 jobs. Recycled water can be relied upon because we never run out of wastewater.

But recycled water is more than simply economically smart. According to Rich Robertson of Robertson's Ready Mix, the largest concrete company in Southern California, using recycled water is financially as well as environmentally responsible. "We hooked up to not only save 20 percent, but to conserve water as well," he said. "Everybody should use recycled water if we want to have water to drink in 20 years," Robertson said. In addition to the economic and conservation benefits, the use of recycled water in the Los Angeles area reduces by over 70 million gallons a day the amount of treated wastewater being discharged into the Santa Monica Bay.

As companies throughout the Los Angeles area can attest, industry can and should take advantage of the reliability, cost savings and environmental value of using recycled water.

STEVEN HINES

Conservation analyst, West Basin Municipal Water District.

The public already distrusts drinking water. Will the addition of recycled water to the potable water supply further erode public confidence in tap water?

Southern California enjoys one of the safest supplies of drinking water in the world. This fact is often skewed by commonly held misconceptions related to drinking water supplies and water quality. Many of these misconceptions are fueled by sensational reports in the media, as well as attacks by environmental groups, the bottled water industry, and home treatment system suppliers.

Scattered outbreaks of *Cryptosporidiosis* have focused attention on weaknesses in the drinking water industry. While this is not a problem in Southern California, *Cryptosporidium* came into the limelight with an outbreak in Milwaukee in 1993 which sickened 400,000 people. These outbreaks, combined with the attacks by the media, environmental groups, and bottled water suppliers collectively undermine public confidence in their water supply.

Recycled water (or water reclamation) offers a safe and accepted method of augmenting water supplies in an area that is heavily reliant on imported supplies. Water reclamation employs "state-of-the-art" treatment techniques to process its supplies. The product is used in strict accordance with local and state regulations that govern recycled water use. The negative perception surrounding recycled water use stems from the nature of the supply and misunderstanding of the treatment process.

The misconceptions about the quality of our drinking water are exacerbated by misunderstanding of reclaimed water. If water suppliers and reclaimed water users fail to educate their customers and the general public on issues related to recycled water, they can look forward to an increasingly distrustful public. On a positive note, if misconceptions about one can be corrected, it will go a long way towards correcting misconceptions about the other. Recycled water use should evoke the same positive image and feeling that a person enjoys when they recycle an empty soda can or glass bottle.

MARK BEUHLER

Director of water quality, Metropolitan Water District of Southern California.

What are legislators doing to promote the use of recycled water?

The California legislature has been highly supportive of recycled water use over the past decade, approving about 25 bills, directly and indirectly impacting water recycling in a positive way. These bills have ranged from state financial assistance to streamlining of water reuse requirements and establishment of a water reuse center at the University of California; and mandating increasing numbers of uses of recycled water. At the beginning of every legislative season, numerous legislators vie with one another to become authors for bills put forward by the Legislative Committee of Water Reuse Association of California, through its legislative advocate Gordon Cologne. (Judge Cologne was an assembly member and co-authored California's Clean Water Act—also known, in his honor, as the Porter-Cologne Act.)

With this background, legislators are favorably predisposed to recommend legislation for water recycling. Over the last decade, a significant amount of outreach and education about water recycling has taken place, the success of which is evidenced with the passage of these favorable bills. Clearly, the lawmakers of California understand the importance of recycled water in the state's future water balance.

Recently, Peter MacLaggan published a compendium of California laws affecting water recycling. This book, entitled, "Water Reclamation: A Summary of California Laws and Regulations," is the most authoritative and up-to-date reference on this subject and is regarded as an indispensable item on the desk of every professional engaged in water recycling plans and implementation projects. A sampling of some of the more recent laws enacted follows:

- Making it legal to use recycled water in toilet flushing in the city of Avalon on the island of Santa Catalina where seawater is currently used for this purpose. This is the proverbial foot in the door. It is expected that after a period of successful application, lawmakers and public health officials will want to expand this type of use of recycled water statewide.
- Replacing all legal reference from "reclaimed" water to "recycled," and "reclamation" to "recycling."
- Expanding the use of gray water from residential to commercial and industrial settings.
- Establishing a Water Reuse Research Center at the University of California.

The Legislative Committee of Water Reuse Association of California continues to develop and offer legislative proposals that streamline the field without compromising the public health. This committee is soliciting ideas from the members and others interested in furthering water recycling and increasing the reliable supply of water in the state.

BAHMAN SHEIKH

Water reuse and water resources policies specialist, Central and West Basin Municipal Water Districts.

The drought is over. Why should we develop recycled water projects?

With the drought of the late 1980s and early 1990s safely behind us, with the abundant supplies of source water from last winter's rains, and with the advent of water marketing, why water recycling and especially why now?

Our collective memories and attention spans tend to be very short. Once a crisis is over, we move on with our lives and ignore the underlying problems that caused the crisis. We cannot allow this year's rains to overshadow the underlying water supply issues facing Southern California.

We must always be aware that we live in a desert and that the civilization that we have created cannot be sustained without the vital water supplies on which it is based. Just as our predecessors invested in the magnificent water delivery systems which import supplies into Southern California from hundreds of miles away, we must in turn invest in those facilities which will allow us to continue to meet our water needs.

Because water supplies in California are currently fully committed, we must invest in programs which will allow us to make better use of the existing developed supplies. We must use the water we have if we are to continue to support the lifestyle and economy of the region. Since at present, desalination is far too expensive to provide a major part of our supply, we must turn to water conservation and water recycling. As individual consumers we must use the current domestic water supplies as effectively as practical. At the regional level we must develop cost-effective programs to use imported water more than once before discharging it to the ocean.

Major urban cities in California have Urban Water Management Plans which provide the framework for making water supply investments for the next 20 years. These plans stress the need for a balanced water supply that continues reliance on our imported water supplies; supports regional investments in facilities which will increase the ability to save water during wet periods for dry periods; and calls for the cities to meet their growth needs through water conservation and water recycling. A key provision for meeting this goal is the recommended program of developing water recycling projects.

If we follow through and implement the recommendations of these plans, there will be a totally reliable water supply for these cities and water rationing will be considered a dinosaur from the 1970s and 1990s.

JERRY GEWE

Senior engineer, DWP, Water Resources Section.



Lake Balboa, located in Balboa Park - Van Nuys, is filled with recycled water from the Donald C. Tillman Water Reclamation Plant.

THANKS TO ALL WHO CONTRIBUTED RESPONSES

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