THE CITY OF SAN DIEGO

CITY OF SAN DIEGO

Water Purification Demonstration Project

Project Report

JULY 2013

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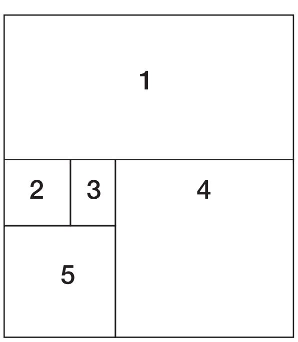

1. The Advanced Water Purification Facility
2. Ultraviolet Light/Advanced Oxidation equipment
3. Reverse Osmosis canisters
4. Microfiltration and Ultrafiltration systems
5. San Vicente Reservoir

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This Water Purification Demonstration Project Report is the culmination of a multi-year program to assess the feasibility of supplementing one of San Diego's local water supply reservoirs, San Vicente Reservoir, with purified water produced at an advanced water purification facility. The combined contributions of the project team, regulatory agency representatives, Independent Advisory Panel members, and local stakeholders were invaluable in implementing a comprehensive project. This section recognizes participants who contributed substantially to this effort.

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Figures and Tables

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Terms and Abbreviations

AF	Acre-feet
AFY	Acre-feet per year
AWP Facility	Advanced Water Purification Facility – the existing demonstration-scale facility constructed and operated for the Water Purification Demonstration Project
Basin Plan	Water Quality Control Plan for the San Diego Basin
Bureau of Reclamation	United States Bureau of Reclamation
CDPH	California Department of Public Health
CEC	Constituent of emerging concern
CEQA	California Environmental Quality Act
City	City of San Diego
City Council	San Diego City Council
CTR	California Toxics Rule
Demonstration Project	Water Purification Demonstration Project
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
Full-scale AWP facility	Full-scale AWP facility that would be implemented for future full-scale reservoir augmentation
GIS	Geographic Information Systems
IAP	Independent Advisory Panel
IROC	Independent Rates Oversight Committee
kWh	Kilowatt hours
LRWRP	Long-Range Water Resources Plan
MCL	Maximum Contaminant Level
mgd	Million gallons per day
NDMA	N-Nitrosodimethylamine
North City	North City Water Reclamation Plant
NR&C	Natural Resources & Culture Committee
NPDES	National Pollutant Discharge Elimination System
NWRI	National Water Research Institute
O&M	Operations and maintenance
Orange County GWRS	Orange County Groundwater Replenishment System
Point Loma	Point Loma Wastewater Treatment Plant

Regional Board	San Diego Regional Water Quality Control Board
RWS	City of San Diego Recycled Water Study, 2012
SR-52	State Route 52
State Board	State Water Resources Control Board
Water Authority	San Diego County Water Authority
WDR	Waste Discharge Requirements

Glossary of Terms

1,4-dioxane	A solvent used in industrial and commercial applications. The California Department of Public Health uses 1,4-dioxane as an indicator compound to assess the performance of advanced oxidation since it is difficult to remove from water. The ability of a purification process to remove 1,4-dioxane indicates to the California Department of Public Health that the purification process provides a robust barrier to a wide array of chemicals.
Acre-feet (AF)	A term commonly used in the water industry to measure large quantities of water. An acre-foot is defined as the amount of water required to cover one acre to a depth of one foot. An acre-foot is equivalent to 325,851 gallons and is considered enough water to meet the needs of two families of four with a house and a yard for one year.
Advanced oxidation	A set of chemical treatment processes designed to destroy organic material by breaking down its molecular structure. The advanced oxidation process used at the Advanced Water Purification Facility employs ultraviolet light and hydrogen peroxide, which break down organic molecules into natural elements, such as carbon, hydrogen, and nitrogen.
Advanced Water Purification Facility	The one-mgd demonstration-scale facility located at the North City Water Reclamation Plant. Generally abbreviated as the AWP Facility. The facility is considered "advanced" because of the high level of treatment using reverse osmosis and advanced oxidation. The AWP Facility was one element of the multi-faceted Demonstration Project.
Augmentation of water supply	The process of adding purified water to an existing raw or untreated water supply such as a reservoir, lake, river, wetland, and/or groundwater basin where it will blend with raw water supplies.
Beneficial reuse	The use of recycled water for purposes that contribute to the economy or environment of a community, such as landscape irrigation and industrial purposes.
Beneficial use	Specific designated water uses such as municipal, recreation, and agricultural, which are provided water quality protections to allow those uses to continue to occur in the future.
Blending	Mixing or combining one water source with another, such as combining purified water with imported water sources.

Brackish water	Water that has a higher salt content than fresh water, but not as high as seawater. Usually, the salts must be removed or reduced before the water is usable.
California Department of Public Health (CDPH)	The state agency responsible for public health in California. It is a subdivision of the California Health and Human Services Agency. One of its functions is to develop and enforce drinking water quality standards and regulations for public water systems.
Clean Water Act	The federal law passed in 1977 that establishes how the United States will restore and maintain the chemical, physical, and biological integrity of the country's waters, including oceans, lakes, streams and rivers, groundwater, and wetlands.
Conductivity	The ability to conduct or transmit electricity. Conductivity of water increases with the concentration of dissolved ions, so measuring conductivity provides a measure of the concentration of dissolved ions in water.
Constituent	A dissolved chemical element or compound, or a suspended material that is carried in the water.
Constituents of emerging concern	Unregulated contaminants, including commonly used pharmaceuticals, personal care products, flame retardants, and unregulated pesticides.
Contaminant	An organic or inorganic substance found in water. Some contaminants cause adverse health effects in humans and, therefore, are regulated in drinking water (see Maximum Contaminant Level). Not all contaminants are unsafe.
Conventional wastewater treatment	A combination of treatment steps that stabilizes and removes solids and organic material from wastewater.
Demonstration Project	See Water Purification Demonstration Project
Disinfection	The removal, inactivation, or destruction of microorganisms present in a water supply that may be harmful to humans. Commonly used disinfectants include chlorine and its derivatives, ultraviolet light, and ozone. Chlorine and its derivatives can also be used to provide residual disinfection that protects the water as it goes through the pipes to homes and businesses.
Disinfection byproduct	Chemicals formed during water treatment as a byproduct of reactions between natural organic matter in the water and an added disinfectant. In drinking water, some disinfection byproducts may have potential health concerns.

Drinking water	Water that meets federal drinking water standards as well as state and local water quality standards so that it is safe for human consumption. Water treatment facilities that produce drinking water require a state permit. Also referred to as potable or treated water.
Drinking water treatment plant	In the San Diego region, drinking water treatment plants draw unfiltered water from reservoirs and use a four-step process of coagulation, settling, filtration, and disinfection to produce water that is safe to drink (see drinking water).
Drought	A defined period of time when rainfall and runoff in a geographic area are much less than average.
Environmental buffer	A water body such as a groundwater basin or a surface water reservoir that provides additional dilution and retention of purified water prior to its use as drinking water.
Environmental Impact Statement/Environmental Impact Report	Detailed analysis of impacts of a project on all aspects of the natural and human environment. An Environmental Impact Statement is required by the federal National Environmental Policy Act for federal permitting or use of federal funds. An Environmental Impact Report is required by the California Environmental Quality Act for local projects.
Epilimnion	The top-most layer of warm water present within a stratified water reservoir (see stratification).
Filtration	A process that separates small particles from water by using a porous barrier to trap the particles while allowing the water to pass through.
Groundwater	Water beneath the earth's surface that supplies wells and natural springs. A groundwater basin is any underground area that contains and can store water.
Groundwater Replenishment Reuse Draft Regulation (California Department of Public Health Groundwater Recharge Criteria)	Draft regulation released by the California Department of Public Health in 2011, which reflects the California Department of Public Health Drinking Water Program's proposed regulation for replenishing groundwater with purified water.
Full-scale reservoir augmentation project	A potential third phase of the City's Water Reuse Program, which would include implementation of a full-scale reservoir augmentation project at San Vicente Reservoir (see reservoir augmentation).
Hydrogen peroxide	Chemical added in the ultraviolet disinfection/advanced oxidation step of the advanced water purification process.
Hypolimnion	The bottom-most layer of cool water present within a stratified water reservoir (see stratification).

Imported water	A water source that originates in one hydrologic region and is transferred to another hydrologic region. In San Diego's case, water is imported from Northern California or the Colorado River and travels to San Diego in large above-ground aqueducts or underground pipelines.
Independent Advisory Panel (IAP)	An independent panel of experts convened to provide expert peer review of the technical, scientific, and regulatory aspects of the Demonstration Project.
Indicator compounds or indicator organisms	A common method to evaluate water or wastewater quality using representative chemicals or organisms that are characteristic of a larger group of related chemicals or organisms. Coliform bacteria are common indicator organisms, and trihalomethanes, benzene, 1,4-dioxane, and NDMA are examples of indicator compounds.
Indirect potable reuse	An industry term referring to projects that augment groundwater and surface waters with purified water. This term was originally used to distinguish between direct potable reuse, which is the introduction of purified water into the drinking water system without an intermediate environmental buffer, and systems that did incorporate an environmental buffer. Potable reuse is a general term used to refer to both direct and indirect purified water projects.
Local limits	Local limits are wastewater limitations that apply to commercial and industrial facilities discharging wastewater to a municipal public system. Local limits control the pollutants in wastewater discharges.
Maximum Contaminant Level (MCL)	The highest allowable amount of a contaminant in drinking water, established by the United States Environmental Protection Agency.
Membrane filtration	A type of filtration used to separate particles from water. Membrane filters are characterized by the size of the openings (pores), which are ranked from the largest to the smallest pore size: microfiltration, ultrafiltration, nanofiltration and reverse osmosis.
Microfiltration	A low-pressure membrane filtration process where tiny, hollow, straw-like membranes separate small suspended particles, bacteria and other materials from water. Microfiltration provides efficient preparation of water for reverse osmosis and is used to process food, fruit juices and sodas; and to sterilize medicines that cannot be heated.
Million gallons per day	This term is used to describe the flow of water treated and distributed from a treatment plant each day.

N-nitrosodimethylamine (NDMA)	N-nitrosodimethylamine is a chemical that is found in a variety of natural and man-made sources and can be formed during wastewater treatment. It is used by the California Department of Public Health as an indicator compound to assess the performance of advanced oxidation since it is difficult to remove from water. The ability of a purification process to achieve removal indicates to the California Department of Public Health that the process provides a robust barrier to a wide array of chemicals.
National Pollutant Discharge Elimination System (NPDES)	A federal permit authorized by the Clean Water Act, Title IV, which is required for discharge of pollutants to waters of the United States, and includes any discharge to lakes, streams, rivers, bays, the ocean, wetlands, storm sewer, or tributary to any surface water body.
Non-potable water	Water that is not suitable for drinking because it has not been treated to drinking water standards (see drinking water). Includes recycled water as well as raw or untreated water.
North City Water Reclamation Plant (North City)	Wastewater treatment plant that produces recycled water through a combination of conventional wastewater treatment and tertiary treatment (see conventional wastewater treatment and tertiary treatment).
Orange County Groundwater Replenishment System (GWRS)	A project that employs water purification processes similar to those tested at the AWP Facility, which has been operational since 2008. This project provides a model for the City's potential reservoir augmentation project in that it uses similar water purification technology and is permitted under a similar regulatory framework.
Oxidation	A treatment step used in disinfection, in which oxygen or ozone is added to water to produce a chemical reaction that removes potentially harmful substances.
Pathogens	Disease-causing organisms. The general groupings of pathogens are viruses, bacteria, protozoa, and fungi.
Pipeline system	Pipeline system, including pump station and reservoir inlet structure, which would convey purified water from North City to San Vicente Reservoir. Also referred to as purified water pipeline system.
Point Loma Wastewater Treatment Plant (Point Loma)	Advanced primary wastewater treatment plant that discharges treated wastewater to the Pacific Ocean.
Pretreatment	The treatment of wastewater near its source to remove harmful pollutants before being discharged to a sewer system.
Primary drinking water standards	Legally enforceable federal and state standards that must be met by public water systems. Primary drinking water standards protect public health by limiting the levels of contaminants in drinking water.

Purified water	Water that starts out as wastewater from homes or businesses and is collected and put through a series of treatment and purification steps such that it meets all drinking water standards and can be added to water supplies ultimately used for drinking water. The treatment includes membrane filtration with microfiltration or ultrafiltration, reverse osmosis, and advanced oxidation that consists of disinfection with ultraviolet light and hydrogen peroxide. Purified water may be released into a groundwater basin or surface water reservoir that supplies water to a drinking water treatment facility.
Raw water	Water that has not been treated for use. Examples of raw water are water in the Colorado River aqueduct, the State Water Project aqueduct, open reservoirs (whether filled with imported water or runoff), rivers, naturally-occurring lakes and some well water.
Recycled water	Water that originated from homes and businesses as municipal wastewater and has undergone a high degree of treatment at a water reclamation facility so that it can be beneficially reused for a variety of purposes. This is the type of water that is produced at North City and is the source water for the AWP Facility.
Reservoir augmentation	The process of adding purified water to a surface water reservoir. The purified water undergoes advanced treatment prior to being blended with untreated water in a reservoir. The blended water is then treated and disinfected at a conventional drinking water treatment plant and is distributed into the drinking water delivery system.
Reverse osmosis	A high-pressure membrane filtration process that forces water through the molecular structure of several sheets of thin plastic membranes to filter out minerals and contaminants, including salts, viruses, pesticides, and other materials. The reverse osmosis membranes are like microscopic strainers; bacteria and viruses as well as inorganic and most organic molecules cannot pass through the membranes. Reverse osmosis membranes have a smaller pore size than all other types of membranes.
Retention time	The amount of time that purified water is retained in a water body such as a groundwater basin or surface water reservoir prior to being extracted.
Secondary drinking water standards	Drinking water quality standards that are not enforced, but serve as guidelines to assist public water systems in managing drinking water aesthetic conditions such as taste, color and odor.

Source control	Programs and/or processes in place to provide regulatory oversight of sewer discharges in order to protect the pipeline system and the wastewater treatment plant from harmful discharges. Source control programs typically focus on industrial and commercial (non-residential) customers and may include a variety of activities such as permitting, sampling, enforcement and oversight related to industrial discharges. For projects where purified water would enter the drinking water system via groundwater or surface water augmentation, the California Department of Public Health requires that source control programs be augmented to address residential and commercial facilities, and focus on an expanded set of contaminants that may have public health relevance, such as industrial chemicals, pharmaceuticals, and personal care product residuals sometimes found in wastewater.
Stratification	The formation of layers of water within a reservoir. This is a natural phenomenon that occurs in all reservoirs in North America. During the period of stratification, warm water that is naturally heated by the sun is contained within the top-most layer, or epilimnion, and denser cooler water is contained within the lower layer, or hypolimnion.
Tertiary treatment	Treatment of wastewater to a level beyond secondary treatment but less than water purification. Water treated to this level is considered to be recycled water, which is suitable for many beneficial uses including irrigation and industrial processes. Tertiary water meets treatment and reliability criteria established by Title 22, Chapter 4, of the California Code of Regulations.
Total organic carbon (TOC)	Total organic carbon is a measure of the amount of carbon that is bound in organic molecules, including all natural and man-made organic chemicals.
Ultrafiltration	A membrane filtration process with pore size openings smaller than microfiltration and larger than nanofiltration or reverse osmosis. Also used to characterize the size of particles removed.
Ultraviolet disinfection/advanced oxidation	Process by which water is exposed to ultraviolet light to provide disinfection, similar to the process for disinfecting instruments in medical and dental offices. Additionally, ultraviolet light combined with hydrogen peroxide creates an advanced oxidation reaction that eliminates any remaining compounds in water by breaking them down into harmless compounds.
United States Environmental Protection Agency (EPA)	The federal agency responsible for protecting public and environmental health in the United States. Its functions include developing and enforcing water quality standards for drinking water as well as man-made and naturally-occurring waters of the United States.

Wastewater	Untreated water collected in the sewer system from residences and businesses (e.g., from bathtubs, showers, bathroom sinks, clothes washers, toilets, kitchen sinks, dishwashers, and industrial processes). Wastewater is more than 99 percent water with impurities.
Wastewater collection system (collection system)	System that conveys wastewater from residences and businesses to a wastewater treatment plant such as North City.
Water Purification Demonstration Project (Demonstration Project)	The second phase of the City of San Diego's Water Reuse Program. During this test phase, the Advanced Water Purification Facility was operated for approximately one year to collect operating data, producing one million gallons of purified water per day. The Advanced Water Purification Facility remains online. A study of San Vicente Reservoir was conducted to test the key functions of reservoir augmentation and to determine the viability of a full-scale project. No purified water was sent to San Vicente Reservoir during the demonstration phase.
Water purification process	The process of using water purification technology on recycled water to produce a water supply that can be used for reservoir augmentation and ultimately for drinking water purposes. The process of water purification begins with recycled water, which has already been treated to produce a supply of water safe enough for use in irrigation and industrial purposes. This recycled water is then further treated using water purification technology. The resulting purified water can be used to augment local surface water supplies, which would be treated once more at a drinking water treatment plant to produce drinking water.
Water Quality Control Plan for the San Diego Basin (Basin Plan)	This plan establishes water quality objectives and implementation plans to protect different beneficial uses that are established for specific water bodies in the San Diego Regional Water Quality Control Board region (see beneficial use).
Water Reuse Program	The City's three-phased program, which is a potential local option to increase water supply reliability through the beneficial reuse of water.

Using This Report

This Project Report provides an overview of the technical studies, advanced water purification facility testing, and public education and outreach efforts conducted as part of the City of San Diego's Water Purification Demonstration Project. It also presents findings that support the conclusion that implementation of a reservoir augmentation project at San Vicente Reservoir is feasible.

This Project Report presents background information, key findings for each of the core components of the Demonstration Project, and considerations for full-scale project implementation. It is organized as shown in the following table.

Section A |	Introduction and Summary of Findings
Section B |	Advanced Water Purification Facility
Section C |	San Vicente Reservoir Study
Section D |	Regulatory Coordination
Section E |	Public Outreach and Education
Section F |	Full-Scale Project Considerations
Section G |	Summary and Conclusions
Section H |	Project Report Approval

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Section A: Introduction and Summary of Findings

The Water Purification Demonstration Project was a multi-year project designed to assess the feasibility of supplementing one of San Diego's local water supply reservoirs, San Vicente Reservoir, with purified water produced at an advanced water purification facility. The project is an integral component of the City's plan to improve water supply reliability by developing local, drought-tolerant water supplies. The Water Purification Demonstration Project involved installing and operating a demonstration-scale advanced water purification facility, studying San Vicente Reservoir, implementing a public outreach and education program, developing conceptual design criteria and costs for a full-scale advanced water purification facility and pipeline facilities, and developing a conceptual pipeline alignment.

The advanced water purification facility is a component of the Water Purification Demonstration Project.

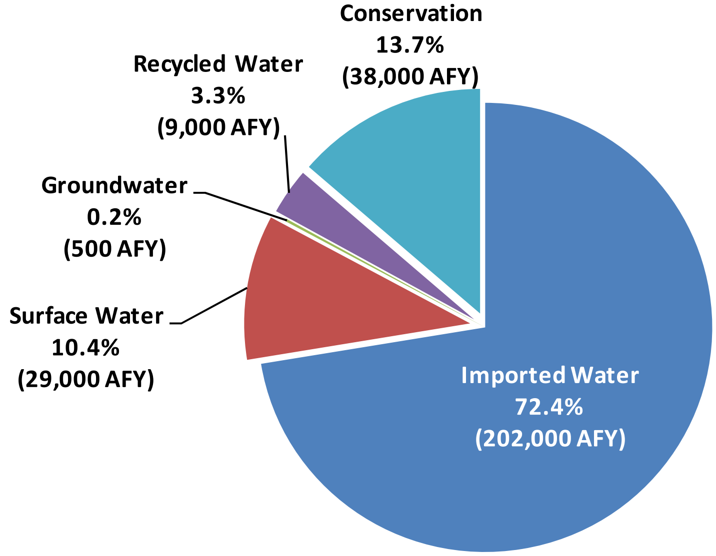
This Project Report provides an overview of the technical studies, advanced water purification facility testing, and public education and outreach efforts conducted as part of the Water Purification Demonstration Project. It also presents findings that support the conclusion that implementation of a reservoir augmentation project at San Vicente Reservoir would be feasible.

In 1813 Spanish settlers and missionaries completed a dam and flume on the San Diego River to supply water to Mission San Diego de Alcala. This effort to secure a dependable water source for the mission was the first water supply project on the West Coast. Two hundred years later San Diego continues its quest to secure reliable and locally controlled sources of water. Using modern technologies and advanced science, the Water Purification Demonstration Project moves the City toward a future of dependable water supplies.

San Diego's Water Supply Reliability Challenges

The City of San Diego (City) provides drinking water to more than 1.3 million people. In addition to supplying approximately 274,000 metered service connections within its own incorporated boundaries, the City supplies water to the City of Del Mar; Santa Fe and San Dieguito Irrigation Districts; and California American Water Company, which, in turn, serves the Cities of Coronado and Imperial Beach and portions of south San Diego (City of San Diego, 2011a). The City's projected total water use in 2015, including wholesale deliveries to other agencies, is

240,000 acre-feet (AF), which is equivalent to 78,000 million gallons, or 210 million gallons per day (mgd) (City of San Diego, 2011a). The City's actual water use in fiscal year 2012, which also included wholesale deliveries to other agencies, was 190,000 AF,(based on data from the City of San Diego, Public Utilities Department, Water Operations Division. This is equivalent to 63 million gallons or 170 mgd. Actual water use varies from year to year because of climatic and economic conditions. Further, the mandatory use restrictions enforced during the 2009/2010 drought appear to have had a lasting effect on water use, as demands have not yet rebounded to their pre-drought levels. The City meets water demands with the following supplies:



Existing water resource mix projected for 2015 normal/average hydrologic conditions (AFY = acre-feet per year) (City of San Diego, 2012c)

- Imported water, which includes water imported from the San Francisco Bay / Sacramento – San Joaquin Delta (Bay-Delta) in Northern California or the Colorado River
- Local surface water
- Groundwater
- Recycled water

San Diego is situated at the end of a complex network of state, federal, and local water projects.

In an average year, approximately 85 to 90 percent of the City's water supplies are imported water, which is water that is supplied from the Bay-Delta in Northern California or the Colorado River through a network of state, federal, and local pipeline facilities (City of San Diego, 2012b). The cost of imported water has increased significantly and is expected to continue to increase into the future. From 2007 to 2012, Metropolitan Water District's (MWD's) imported water costs increased by more than 12 percent annually, and MWD projects its 2014 full service water rate to be seven percent greater than its 2012 rate. Going forward, the San Diego County Water Authority (Water Authority) projects that its untreated water rates will double in less than 10 years (City of San Diego, 2012c).

Environmental stressors, such as ongoing drought in the Colorado River Basin, reduced snowpack and runoff in Northern California, and court-ordered pumping restrictions necessary to protect endangered species, have decreased the reliability of imported water supplies (City of San Diego, 2012b).

Imported water reliability issues, coupled with recurring droughts in the San Diego region, have placed considerable strain on the City's ability to meet water demands. The City has taken a variety of actions to maximize water resources and improve water supply reliability, including the following.

- The City supports a wide array of **water conservation measures** designed to reduce water demands and maximize water use efficiency. A signatory to the Memorandum of Understanding with the California Urban Water Conservation Council since 1991, the City employs a variety of urban Best Management Practices for conserving water (City of San Diego, 2011a). City-wide conservation efforts resulted in an approximate water savings of 34,000 AF in 2010 (City of San Diego, 2011a).
- In 2002, the City developed a **Long-Range Water Resources Plan** (LRWRP) that defines a plan to reduce reliance on imported water supplies and develop and maximize local water resources. The LRWRP is currently being updated (draft 2012 LRWRP) to reflect recent changes in the availability, costs, and reliability of various water supply sources (City of San Diego, 2012c).

A Word About Imported Water Reliability

Water is essential to our quality of life. The City imports 85-90 percent of its water supply from the Bay-Delta in Northern California and the Colorado River. In recent years, both Southern California and the Colorado River system have experienced drought conditions. In addition, legal and regulatory decisions to protect endangered species have restricted the amount of water that can be pumped from Northern California. Since San Diego is at the end of the imported water pipeline, and receives an average of 10-12 inches of rain each year, local, drought-tolerant water supplies are critical to securing a reliable supply of water now and in the future.

Local reservoir levels have been lower than typical due to dry conditions.

Pumping from the Bay-Delta is limited to protect endangered species such as the Delta Smelt.

- The City is a member of the Regional Water Management Group administering the **San Diego Integrated Regional Water Management Program**, which uses an integrated regional approach to address water management issues.
- The City is conducting independent studies as well as participating with the United States Geological Survey and the United States Bureau of Reclamation (Bureau of Reclamation) on **groundwater basin studies and hydrogeologic investigations** to better understand the complex hydrogeology of the San Diego coastal area, the water supply potential of the local groundwater basins, and the potential for desalination of saline groundwater located near the coast (brackish groundwater) (City of San Diego, 2011a).
- The City is implementing a **Water Reuse Program** designed to maximize water reuse.

The following sections discuss the elements of the Water Reuse Program, including the Water Purification Demonstration Project, in more detail.

Maximizing Local Supplies with the Water Reuse Program

In response to San Diego's ongoing water supply challenges, the City initiated a comprehensive Water Reuse Program in the early 2000's. The Water Purification Demonstration Project is the second phase of this initiative designed to maximize the use of recycled water throughout the City.

Phase 1: Water Reuse Study

In 2006, the City completed the Water Reuse Study, which included a comprehensive evaluation of all viable options to maximize the use of recycled water produced by the City's two water reclamation plants (City of San Diego, 2006). The study included analysis and research on the health effects of reuse options and implemented a comprehensive public participation process. Based on the information presented in the Water Reuse Study, a stakeholder group determined that the preferred option for maximizing use of the City's recycled water supply would be to augment existing supplies in the City's San Vicente Reservoir with recycled water—this option is referred to as "reservoir augmentation at San Vicente Reservoir." In response to both the Water Reuse Study and the stakeholder recommendation, the San Diego City Council (City Council) approved the second phase of the Water Reuse Program: the Water Purification Demonstration Project.

What is Reservoir Augmentation?

Reservoir augmentation is the practice of augmenting an existing drinking water supply reservoir by adding purified water. Purified water starts out as wastewater from homes or businesses. It is then collected and put through a series of treatment and purification steps designed to produce purified water that meets all drinking water standards.

Reservoir augmentation as identified in the Water Reuse Study would adhere to the multiple barrier concept that is fundamental to the provision of public health safeguards. These barriers include conventional water recycling treatment as practiced in the San Diego region for more than 30 years, advanced water purification technologies, blending with imported water in San Vicente Reservoir, drinking water treatment at a municipal water treatment plant, and distribution to the City's drinking water system.

Phase 2: Water Purification Demonstration Project

Phase 2 of the Water Reuse Program is the Water Purification Demonstration Project (Demonstration Project). The Demonstration Project, which is the focus of this Project Report, evaluated the feasibility of using water purification technology to produce water that could be sent to San Vicente Reservoir where it would be mixed with a combination of local and imported water supplies prior to being treated at a water treatment plant and distributed as drinking water (see Figure A-1).

(Potential) Phase 3: Reservoir Augmentation at San Vicente Reservoir

Because the concept of using purified water to augment San Vicente Reservoir has been determined to be feasible (as discussed in greater detail in subsequent sections of this Project Report), the Mayor and City Council may consider implementing a reservoir augmentation project at San Vicente Reservoir. The key facilities associated with a reservoir augmentation project at San Vicente Reservoir are presented in Figure A-2.

The City of San Diego's Water Reuse Program

- Phase 1 – The Water Reuse Study, published in 2006
- Phase 2 – The Demonstration Project, which evaluated the feasibility of using purified water to augment San Vicente Reservoir (No purified water was actually sent to the reservoir in Phase 2.)
- (Potential) Phase 3 – The future Full-Scale Reservoir Augmentation Project at San Vicente Reservoir

Figure A - 1: Phase 2 and Potential Phase 3 of the City's Water Reuse Program

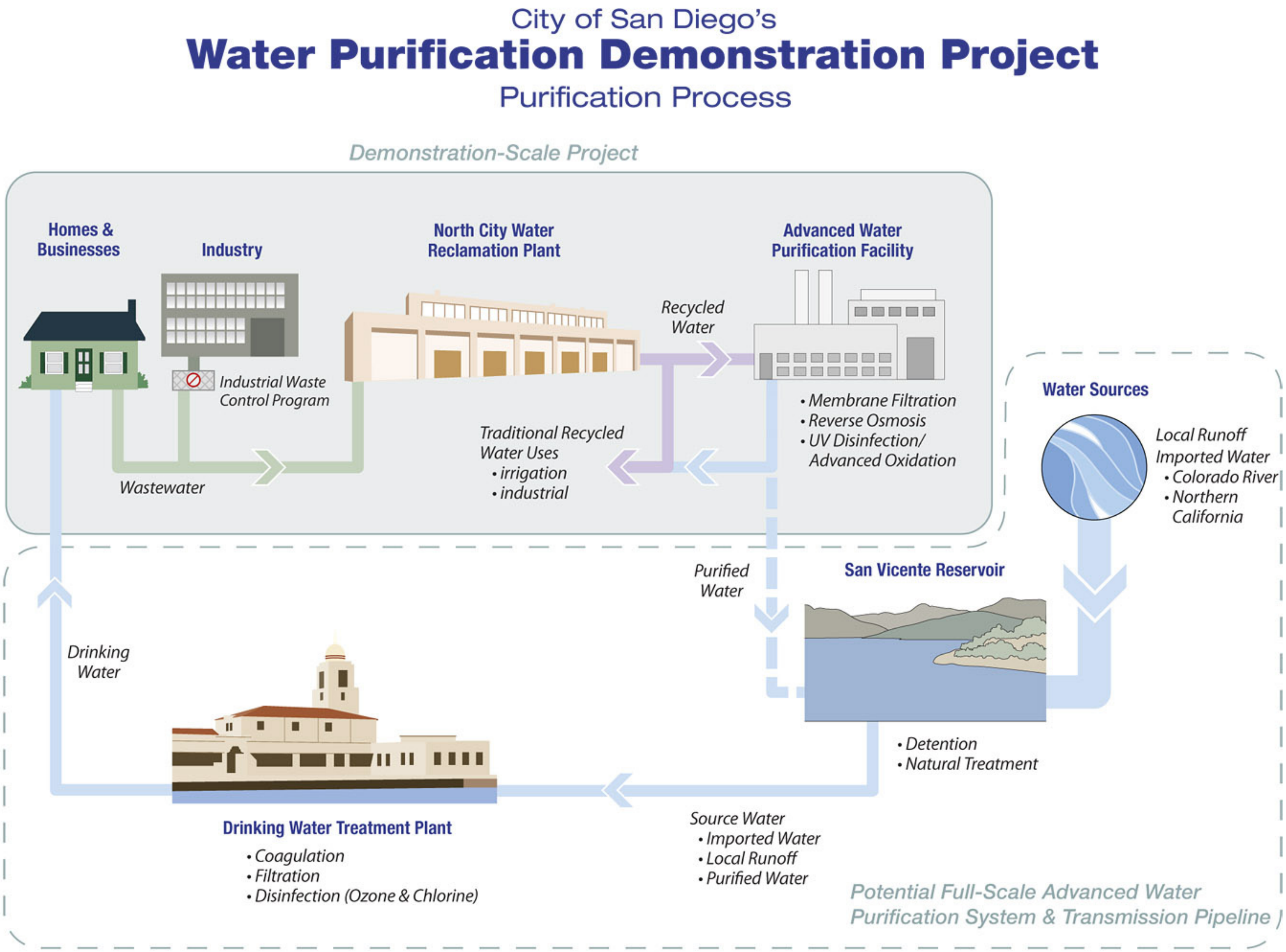
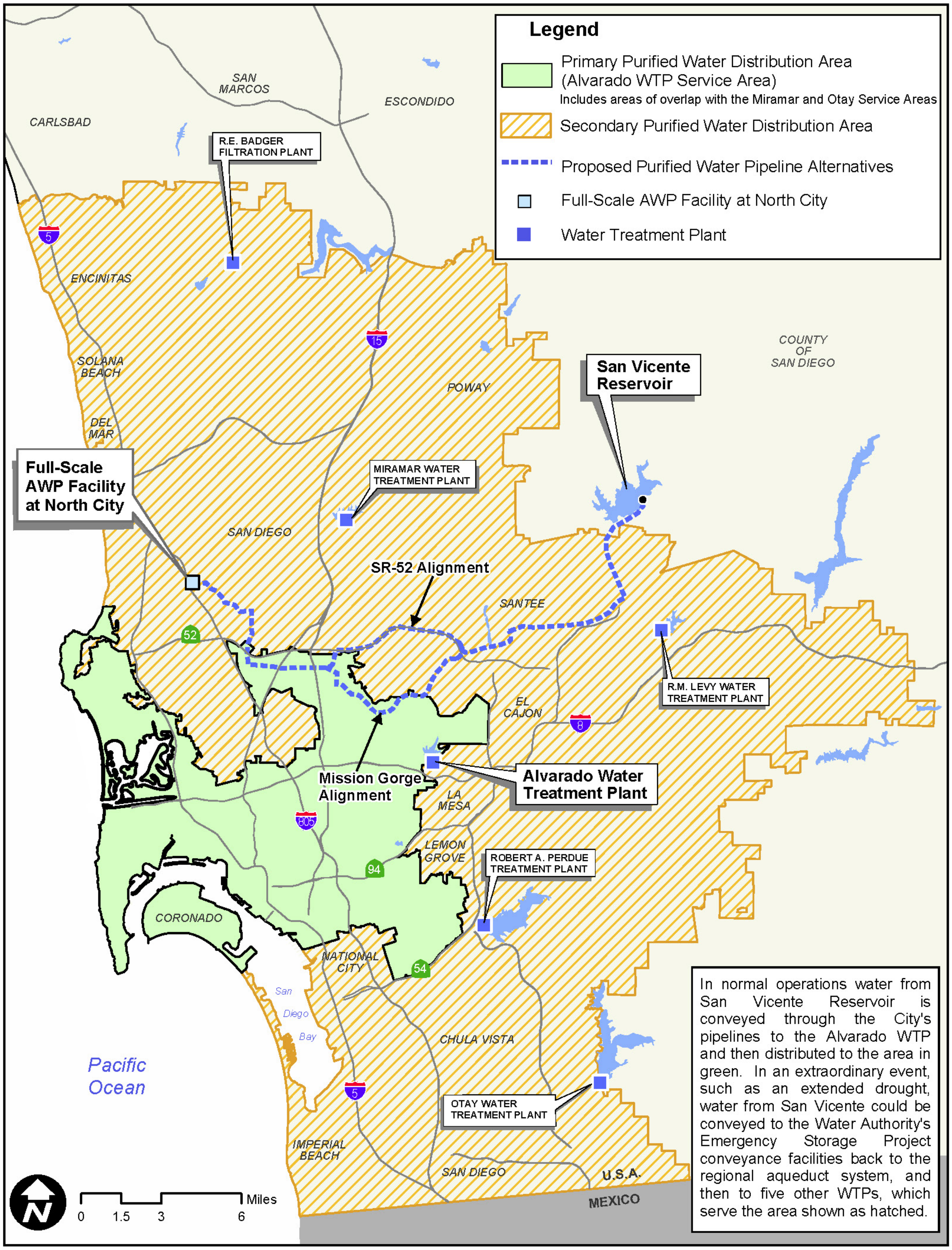


Figure A - 2: Service Area and Facilities of Full-Scale Reservoir Augmentation Project at San Vicente Reservoir



Navigating a Complex Regulatory Setting

Projects in California that involve supplementing ground and surface waters with purified water are regulated by both the California Department of Public Health (CDPH) and the State Water Resources Control Board (State Board) through nine Regional Water Quality Control Boards. To date, seven projects that augment local supplies with purified water have been permitted in California, shown in Table A-1.

Table A - 1: Purified Water Projects Permitted in California

Project Name	Agency	Start Year	Treatment Capacity (mgd)	Actual Deliveries (AFY)[3]
Montebello Forebay Groundwater Recharge Project	Los Angeles County Sanitation District	1962	47.5	50,000
Water Factory 21[1]	Orange County Water District	1977	15.0	10,000
West Coast Basin Seawater Barrier Project	West Basin Municipal Water District	1995	30	5,000
Alamitos Seawater Barrier Project	Water Replenishment District of Southern California	2005	3	3,000
Chino Basin Groundwater Recharge Project[2]	Inland Empire Utilities Agency	2005	18.0	10,000
Dominguez Gap Seawater Barrier Project	Water Replenishment District of Southern California	2006	4.5	1,000
Groundwater Replenishment System Seawater Barrier and Groundwater Replenishment Projects	Orange County Water District	2008	70	66,000 – 72,000

Footnotes:

1. Water Factory 21 began operation in 1976 implementing granular activated carbon. Reverse osmosis was added to treat half the flow in 1977.
2. Full capacity of the Chino Basin Groundwater Recharge Project is 84.4 mgd; however, only 18.0 mgd receives soil aquifer treatment (SAT).
3. AFY = acre-feet per year.

Although these seven permitted projects differ from the City's potential reservoir augmentation project at San Vicente Reservoir—they all focus on augmentation of groundwater supplies as opposed to augmentation of surface water supplies—most use the same water purification technology and have been permitted within the same regulatory framework as the City's potential project. Reservoir augmentation is practiced in other parts of the United States with less rigorous water purification processes. For example, since 1978 the Upper Occoquan Service Authority has added recycled water into a stream above Occoquan Reservoir, which supplies a drinking water treatment plant in Fairfax County, Virginia.

A key component of the Demonstration Project was coordination with both CDPH and the San Diego Regional Water Quality Control Board (Regional Board) to clarify permit conditions and develop sufficient information to determine the regulatory feasibility of a reservoir augmentation project at San Vicente Reservoir. A detailed discussion of regulatory coordination activities conducted as part of the Demonstration Project is presented in Section D of this Project Report.

California Department of Public Health

CDPH is responsible for overseeing public health issues in California and permitting public water supply projects, including projects using purified water to supplement a local water supply. CDPH is in the process of finalizing draft regulations for groundwater augmentation projects using purified water. State legislation passed in 2010 requires CDPH to establish regulations for water purification via surface water augmentation by 2016. In the meantime, surface water augmentation projects like the City's potential reservoir augmentation project at San Vicente Reservoir can be permitted on a case-by-case basis, using the pending groundwater augmentation regulations as guidance. The City's reservoir augmentation project at San Vicente Reservoir would need to meet all state and federal drinking water standards applicable to public water systems, as well as the water purification standards in California's draft groundwater augmentation regulations. The draft groundwater augmentation regulations are very stringent—in many cases exceeding drinking water standards.

Regional Water Quality Control Board

The Regional Board is responsible for developing and enforcing water quality objectives for surface and groundwater bodies within the San Diego region. Because the City's potential reservoir augmentation project at San Vicente Reservoir would involve releasing purified water into San Vicente Reservoir, the project would fall under the jurisdiction of the Regional Board. Unlike groundwater augmentation projects, which often require only a Waste Discharge Requirements (WDR) permit, projects involving release of purified water into surface water bodies require National Pollutant Discharge Elimination System (NPDES) permits. Approval of NPDES permits involves the United States Environmental Protection Agency (EPA) as well as the Regional Board.

An NPDES permit for the City's reservoir augmentation project at San Vicente Reservoir would place limitations on the purified water released into San Vicente Reservoir and incorporate water quality requirements and limits. Surface water quality objectives for San Vicente Reservoir are established by the Regional Board in the *Water Quality Control Plan for the San Diego Basin* (Basin Plan). The Basin Plan establishes water quality objectives for specific water bodies depending on established beneficial uses, which serve as the basis for some NPDES permit limits and conditions.

Regulatory acceptance of the City's Demonstration Project was validated through a Concept Approval letter from the CDPH, a Resolution of Support from the Regional Board, and a Letter of Concurrence from the Regional Board strongly supporting the efforts of the City and concurring on the preferred regulatory pathway.

Independent Advisory Panel

Demonstration Project IAP Members

One example of the high standards established by CDPH for projects involving water purification is the requirement to convene an Independent Advisory Panel (IAP) to provide expert peer review of the technical, scientific, and regulatory aspects of the City's water purification concept. An IAP, organized and managed by the National Water Research Institute (NWRI), was convened in 2009 to oversee the Demonstration Project.

The IAP consisted of 10 academics and professionals with extensive expertise in the science of water reuse, including chemistry, microbiology, treatment engineering, operations engineering, water reuse regulatory criteria, limnology, research science, toxicology, and public and environmental health. The IAP reviewed work products associated with the Demonstration Project and provided feedback on various aspects of the project.

The IAP is a fundamental component of the regulatory framework for the City's reservoir augmentation project at San Vicente Reservoir. This requirement is further discussed in Section D: Regulatory Coordination. Table A-2 summarizes the IAP meetings held in support of the Demonstration Project. Information on the IAP and its review and advisory activities can be found in Appendix F.

Table A - 2: Summary of IAP Meetings

Meeting No.	Date	Topic
1	May 11-12, 2009	Introductory meeting for the full IAP to discuss the Demonstration Project Scope
2	March 29-30, 2010	Limnology (reservoir-related) Subcommittee Meeting No. 1 to discuss set-up and calibration of the San Vicente Reservoir Model[1]
3	September 2, 2010	Limnology Working Group Meeting No. 1 to specify and discuss details pertaining to the San Vicente Reservoir Model[2]
4	October 21, 2010	Advanced Water Purification (AWP) Facility Subcommittee Meeting No. 1 to discuss the draft Testing and Monitoring Plan[3]
5	March 17, 2011	Limnology Working Group Meeting No. 2 to review San Vicente Reservoir modeling scenarios, determine potential "worst case scenarios," and discuss pathogen removal[2]
6	June 6-7, 2011	Second meeting of the full IAP to update the group on the Limnology Subcommittee, Limnology Working Group, and AWP Facility Subcommittee activities, and tour the AWP Facility
7	December 6, 2011	Limnology Subcommittee Meeting No. 2 to review and receive comments on the draft San Vicente Reservoir modeling study, and receive input on proposed reservoir public health-related regulatory conditions[1]
8	December 19, 2011	AWP Facility Subcommittee Meeting No. 2 to review AWP Facility operational and water quality data[3]
9	March 9-21, 2012	Conference calls to review and discuss Draft CDPH Proposal[4]
10	March 13, 2012	Limnology Subcommittee Meeting No. 3 to review the San Vicente Reservoir Water Quality Report[1]
11	November 15-16, 2012	Third meeting of the full IAP to review and comment on the Demonstration Project Report and Quarterly Testing Report No. 4 (CDM Smith and MWH, 2013b)

Footnotes:

1. The Limnology Subcommittee was comprised of four IAP members focused on the Limnology Study.
2. The Limnology Working Group was comprised of two IAP members and project staff specifically assigned to vetting the details of the reservoir study.
3. The AWP Facility Subcommittee was comprised of four IAP members focused on the operation and results of the AWP Facility.
4. An ad-hoc subcommittee provided review and comment via a series of conference calls in lieu of face-to-face meetings.

The Demonstration Project – a Path Forward

On October 29, 2007, the City Council voted to accept the Water Reuse Study and directed the Mayor and City staff to implement actions to demonstrate the feasibility of reservoir augmentation at San Vicente Reservoir. These actions, known as the Demonstration Project, were intended to evaluate the feasibility of implementing a reservoir augmentation project at San Vicente Reservoir by determining whether advanced water purification technology can safely and reliably produce purified water that could be sent to a reservoir and later treated at a drinking water treatment plant and distributed as drinking water.

Evolving Terminology

Over time, terminology associated with the City's reservoir augmentation project at San Vicente Reservoir has evolved in response to changes within the industry. When the project was first conceptualized, it was described as an Indirect Potable Reuse / Reservoir Augmentation Demonstration Project. This report refers to the same concept as the Water Purification Demonstration Project (Demonstration Project). Similarly, the Advanced Water Treatment Plant (AWT) conceptualized in early stages of the project is referred to in this report as the advanced water purification (AWP) facility. These changes in terminology reflect an industry-wide recognition that the processes implemented in the AWP facility extend beyond advanced water treatment, and may be more accurately described as water purification processes.

The budget for the Demonstration Project was $11.8 million. Funding for the project was secured through a $1.07 million California Department of Water Resources Integrated Regional Water Management Program (IRWM) grant, a $2.95 million grant from the Bureau of Reclamation, and a temporary water rate increase approved by City Council in November 2008. This temporary rate increase was in effect from January 2009 to September 2010.

Demonstration Project Components

1. Convene an Independent Advisory Panel
2. Design, construct, and operate a demonstration-scale advanced water purification facility at the North City Water Reclamation Plant
3. Conduct a study of San Vicente Reservoir to establish residence time and water quality parameters and conditions of purified water in the reservoir
4. Perform an energy and economic analysis
5. Define the state's regulatory requirements for a full-scale reservoir augmentation project at San Vicente Reservoir
6. Perform a pipeline alignment study
7. Conduct a public outreach and education program

Note: the 2007 City Council directive referred to the advanced water purification facility as the advanced water treatment (AWT) plant and purified water as AWT water. This has been modified to reflect industry-wide changes in terminology.

Figure A-3 presents an overview of the tasks completed as part of the Demonstration Project, consistent with the City Council's aforementioned actions in 2007 and 2008. Key tasks and meetings, reports, and important outcomes are highlighted.

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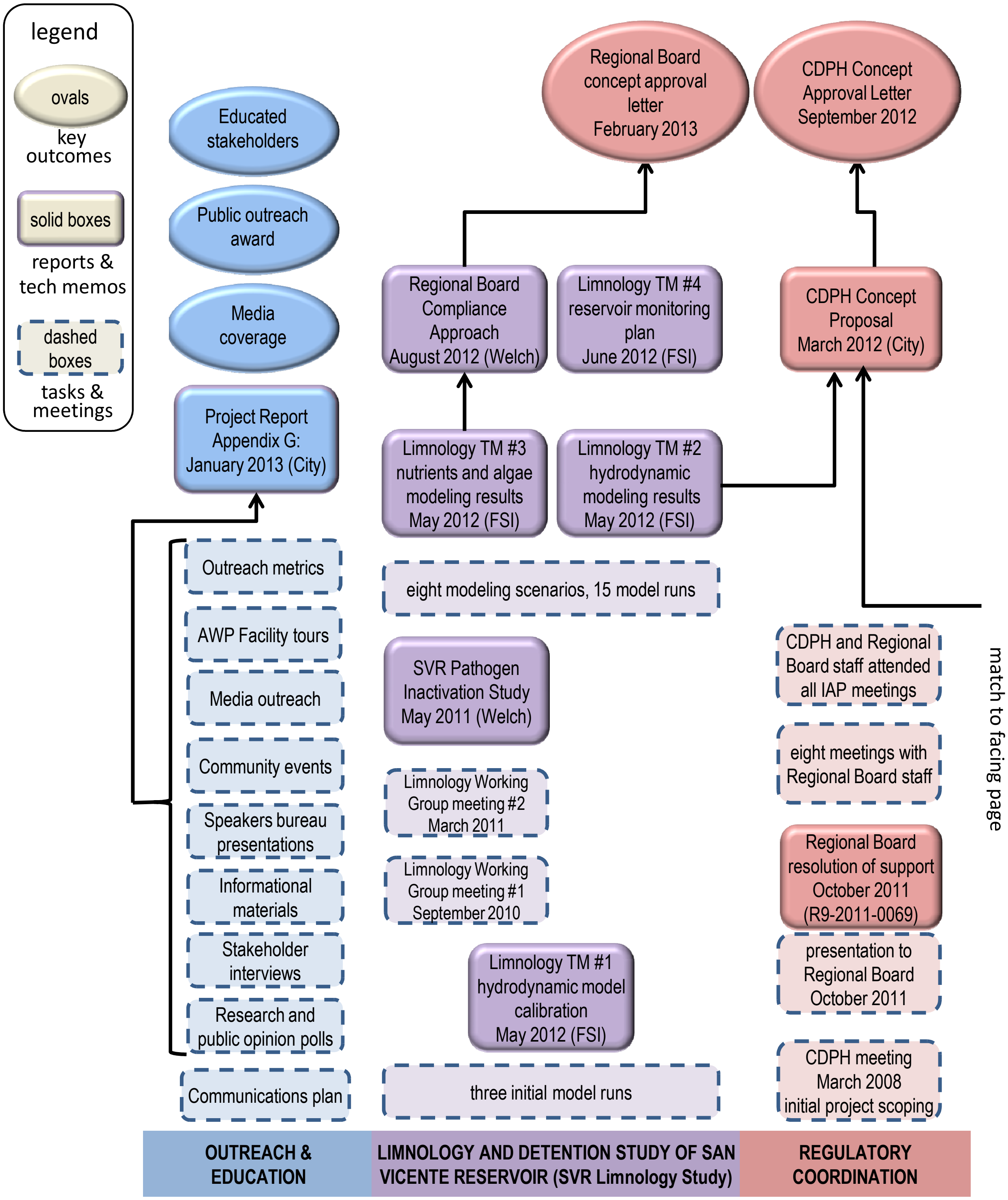
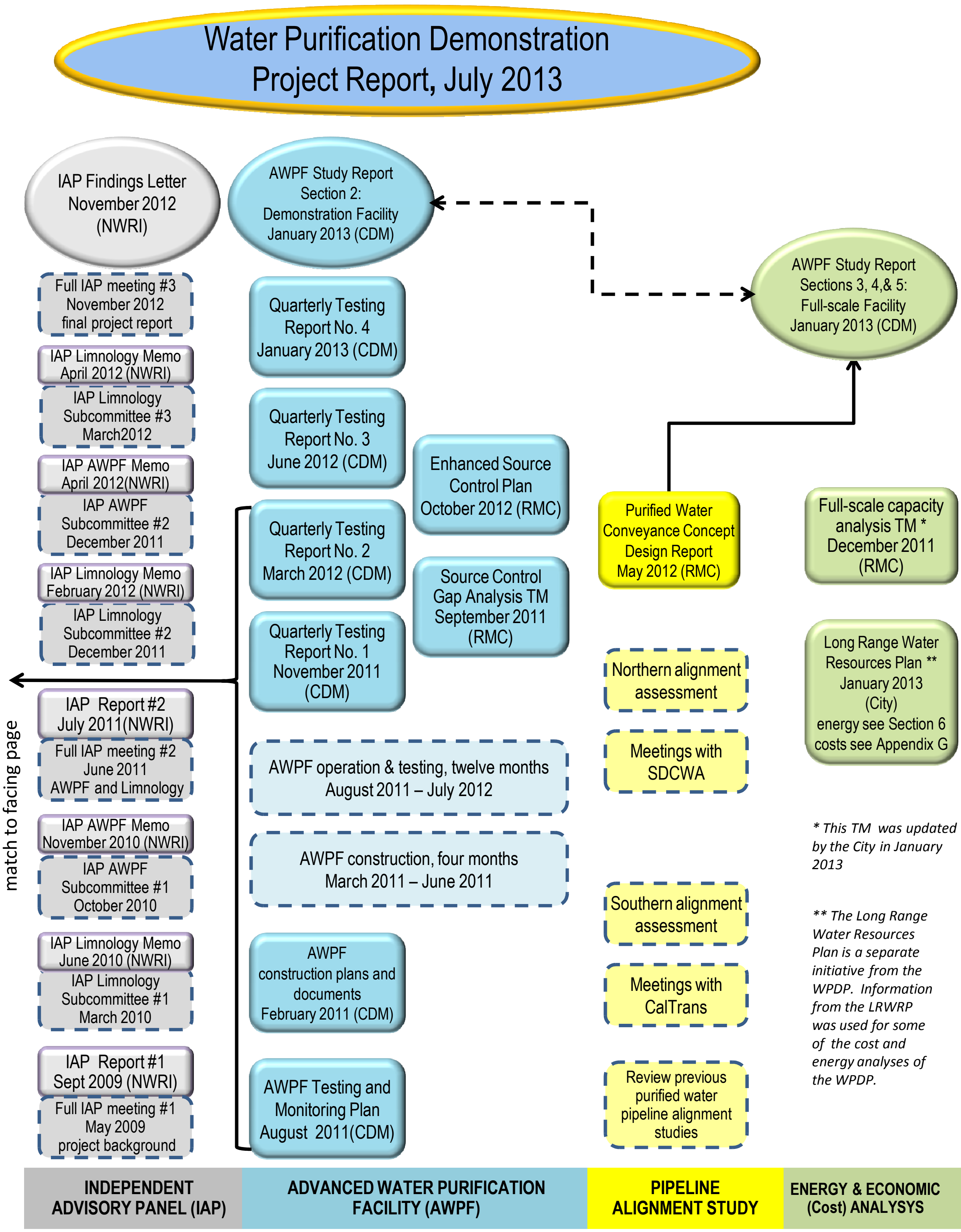
Figure A-3: Key tasks, meetings, reports, and outcomes of the Water Purification Demonstration Project, from project start in 2009 through project completion in 2013




Water Purification Demonstration Project Report, July 2013
IAP Findings Letter November 2012 (NWRI)
AWPF Study Report Section 2: Demonstration Facility January 2013 (CDM)
AWPF Study Report Sections 3, 4,& 5: Full-scale Facility January 2013 (CDM)
Full IAP meeting #3 November 2012 final project report
IAP Limnology Memo April 2012 (NWRI)
IAP Limnology Subcommittee #3 March2012
IAP AWPF Memo April 2012(NWRI)
IAP AWPF Subcommittee #2 December 2011
IAP Limnology Memo February 2012 (NWRI)
IAP Limnology Subcommittee #2 December 2011
match to facing page
IAP Report #2 July 2011(NWRI)
Full IAP meeting #2 June 2011 AWPF and Limnology
IAP AWPF Memo November 2010 (NWRI)
IAP AWPF Subcommittee #1 October 2010
IAP Limnology Memo June 2010 (NWRI)
IAP Limnology Subcommittee #1 March 2010
IAP Report #1 Sept 2009 (NWRI)
Full IAP meeting #1 May 2009 project background
Quarterly Testing Report No. 4 January 2013 (CDM)
Quarterly Testing Report No. 3 June 2012 (CDM)
Quarterly Testing Report No. 2 March 2012 (CDM)
Quarterly Testing Report No. 1 November 2011 (CDM)
Enhanced Source Control Plan October 2012 (RMC)
Source Control Gap Analysis TM September 2011 (RMC)
AWPF operation & testing, twelve months August 2011 – July 2012
AWPF construction, four months March 2011 – June 2011
AWPF construction plans and documents February 2011 (CDM)
AWPF Testing and Monitoring Plan August 2011(CDM)
Purified Water Conveyance Concept Design Report May 2012 (RMC)
Northern alignment assessment
Meetings with SDCWA
Southern alignment assessment
Meetings with CalTrans
Review previous purified water pipeline alignment studies
Full-scale capacity analysis TM * December 2011 (RMC)
Long Range Water Resources Plan ** January 2013 (City) energy see Section 6 costs see Appendix G
* This TM was updated by the City in January 2013
** The Long Range Water Resources Plan is a separate initiative from the WPDP. Information from the LRWRP was used for some of the cost and energy analyses of the WPDP.
INDEPENDENT ADVISORY PANEL (IAP)
ADVANCED WATER PURIFICATION FACILITY (AWPF)
PIPELINE ALIGNMENT STUDY
ENERGY & ECONOMIC (Cost) ANALYSYS

Summary of Findings

The Demonstration Project generated a substantial amount of data related to expected performance of a reservoir augmentation project at San Vicente Reservoir. Major findings of the Demonstration Project are summarized in the following discussion by project component. Each Demonstration Project component is described in further detail later in this Project Report.

Demonstration Advanced Water Purification Facility

The City operated a demonstration-scale Advanced Water Purification Facility (AWP Facility) to gather information on water quality, equipment reliability, regulatory requirements, capital and operating cost, and energy consumption that could be expected if a full-scale advanced water purification facility (full-scale AWP facility) were constructed. Additional benefits included verifying accuracy of online monitoring equipment, optimizing process cost, conducting public tours, and securing regulatory approval.

The AWP Facility was designed, installed, operated, and tested between September 2010 and July 2012. Start-up of the AWP Facility occurred over a one-and-a-half month period (mid-June 2011 through the end of July 2011), and facility testing spanned the following year (August 2011 through July 2012). Although the testing period is complete, the AWP Facility continues to operate for public tours (refer to Section E of this report) and to gather additional equipment performance data.

The Demonstration Facility was installed and operated to produce and test purified water.

The AWP Facility was designed in accordance with the industry-standard multiple barrier approach for water purification processes established by CDPH in the Groundwater Replenishment Reuse Draft Regulation (CDPH, 2011). The major process components were membrane filtration, reverse osmosis, and ultraviolet (UV) disinfection/advanced oxidation.

Key findings from the AWP Facility include:

<u>Monitoring</u>

- Daily testing to identify potential breaches in the membrane filtration units
- Continuous measurement of total organic carbon (TOC) and conductivity to demonstrate that the reverse osmosis system was performing as expected
- Continuous UV reactor power level monitoring to confirm UV lamp operations
- Daily monitoring of hydrogen peroxide dose and continuous flow confirmation to demonstrate that the target hydrogen peroxide dose was achieved

This daily and continuous testing was conducted throughout the 12-month testing period. This extensive monitoring showed that the AWP Facility equipment met the intended treatment performance on a continuous basis and was reliable throughout the operational period.

Comprehensive Water Quality Testing

- Comprehensive water quality testing at the AWP Facility included more than 9,000 tests of the purified water at various points in the treatment process and for 342 different constituents.
- Water quality of the purified water was compared to regulatory limits, verifying that purified water met all applicable water quality standards.

This comprehensive water quality testing shows that the purified water produced at the AWP Facility is pure, approaching distilled water quality. For example, the total dissolved solids (TDS, a measure of salt content) in the purified water is about 15 milligrams per liter (mg/L), compared to TDS in San Diego's source and drinking water of about 500 mg/L. As a second example, the TOC (a measure of carbon that is bound in organic molecules) in the purified water is about 0.1 mg/L compared to TOC of 3.0 mg/L in San Diego's source water and 2.5 mg/L in San Diego's drinking water (City of San Diego, 2012a, City of San Diego, 2012g).

San Vicente Reservoir Study

Supplementing local water sources with purified water is a practice that is gaining wide-ranging support, due in part to projects such as the Orange County Groundwater Replenishment System (GWRS). Although water purification technology is widely recognized as capable of making recycled water into purified water that is drinkable, the regulatory community requires that purified water be retained in an environmental buffer, such as a groundwater basin or a surface water reservoir, prior to being blended into a drinking water system. Retaining purified water in an environmental buffer is considered an additional public health protection feature since it provides dilution by blending the purified water with other water sources and adequate retention time by holding the purified water prior to its release to a drinking water treatment plant. It should be noted that purified water is the best quality water supply available to San Diego. Introducing purified water into San Vicente Reservoir and blending it with lesser quality raw water sources could improve the overall water quality in San Diego's drinking water system.

San Vicente Reservoir is capable of providing environmental buffer features required by regulatory agencies.

San Vicente Reservoir could serve as a highly effective environmental buffer because, in addition to having sufficient storage available to accommodate fluctuating purified water flows throughout the year, it has unique characteristics that would assist in meeting regulatory requirements. Specifically, its large capacity and other natural characteristics, described in detail in Section C of this report, would allow the reservoir to retain the purified water for a substantial period of time before delivery to a municipal drinking water treatment plant such as the Alvarado Water Treatment Plant for final treatment.

To clearly demonstrate the potential reliability characteristics provided by San Vicente Reservoir, a three-dimensional hydrodynamic computer model of the reservoir was set up, including retention time and dilution components as well as a water quality component. The model was used in conjunction with both the Regional Board and CDPH, whose feedback was important to this process due to regulatory requirements for dilution, retention, and water quality conditions. Model set up and validation were also reviewed by the Demonstration Project's IAP, which formed a subcommittee specifically to work closely with the City and its consultants to review and comment on the various scenarios and data.

For the San Vicente Reservoir Study, 18 separate runs of the three-dimensional hydrodynamic model were performed. From these model runs, the project team - with input from the IAP - selected eight modeling scenarios for further assessment and analysis. These modeling scenarios were selected because they represent the full range of operational conditions that a reservoir augmentation project at San Vicente Reservoir could encounter, ranging from average water supply and demand conditions to extreme drought conditions when water demand would be higher than average and natural water levels (water surface level) within the reservoir would be lower than average. The reservoir model also tested four potential locations where purified water could enter San Vicente Reservoir to determine if the location of the purified water's entrance into the reservoir had an impact on water quality, retention, or dilution. Lastly, the reservoir model took into consideration the San Vicente Dam Raise Project, which will more than double the size of the reservoir. The model was used to simulate water movement through the enlarged reservoir. Table A-3 summarizes the eight model scenarios evaluated. The modeling results were provided in five "sets" of modeling runs and captured the expected result of adding purified water to San Vicente Reservoir under the anticipated operating conditions.

More detailed information on the completed modeling runs is provided in Section C, Table C-1 and the Flow Science reports cited in the References section of this report.

Table A - 3: Summary of Model Scenarios Evaluated

No.	Operating Scenario Evaluated
1	**Base Case – Design Inlet Location:** simulated reservoir conditions under median expected storage and normal expected operations with purified water inlet simulated at the Design Inlet Location, shown on Figure C-2.
2	**Base Case – Existing Aqueduct Inlet Location:** simulated reservoir conditions under median expected storage and normal expected operations, with purified water inlet simulated at the Existing Aqueduct Inlet Location, shown on Figure C-2.
3	**Base Case – New Aqueduct Inlet Location:** simulated reservoir conditions under median expected storage and normal expected operations, with purified water inlet at the New Aqueduct Inlet Location, shown on Figure C-2.
4	**Base Case – Barona Arm Inlet Location:** simulated reservoir conditions under median expected storage and normal expected operations with purified water inlet simulated at the Existing Barona Arm Inlet Location, shown on Figure C-2.
5	**No Purified Water Additions:** simulated reservoir conditions similar to Base Case, except there are no purified water additions and an equal reduction in reservoir outflow.
6	**Extended Drought – Design Inlet Location:** simulated reservoir conditions in a hypothetical two-year drought where a large and constant volume of water is withdrawn monthly from the reservoir without importing additional water to refill the reservoir. Purified water inlet was simulated at the Design Inlet Location, shown on Figure C-2.
7	**Extended Drought – New Aqueduct Inlet Location:** simulated reservoir conditions in a hypothetical two-year drought where a large and constant volume of water is withdrawn monthly from the reservoir without importing additional water to refill the reservoir. Purified water inlet was simulated at the New Aqueduct Inlet Location, shown on Figure C-2.
8	**Emergency Drawdown:** simulates reservoir conditions in a hypothetical emergency drawdown situation.

Key findings from the San Vicente Reservoir Study include:

- The addition of purified water into San Vicente Reservoir would not affect natural hydrologic characteristics of the reservoir, seasonal stratification, or mixing. This finding demonstrates that the addition of purified water would not impede the natural blending and retention in the reservoir.
- Dilution and retention of purified water in San Vicente Reservoir would constitute a substantial environmental barrier, sufficient to meet regulatory requirements.
- For all anticipated reservoir operating scenarios and purified water inlet locations, the reservoir would dilute the purified water at all times by at least a factor of 200 to one prior to conveying to the drinking water treatment plant.

- The addition of purified water would not affect water quality in San Vicente Reservoir. The dam raise and reservoir expansion, which is independent of the Demonstration Project, will improve overall water quality in the reservoir by reducing nutrients that cause water quality issues, and the addition of purified water will not change these improvements. In addition, purified water would reduce the salt concentration in the reservoir and improve drinking water quality.

Regulatory Coordination

Prior to moving forward with implementation, the City's reservoir augmentation project at San Vicente Reservoir would require approval by CDPH and the Regional Board. Neither CDPH nor the Regional Board has specific regulations in place for reservoir augmentation projects. A key objective of the Demonstration Project was to work with these regulatory agencies to establish the project features and operating requirements that would ensure public health protection, enabling approval of the City's reservoir augmentation project at San Vicente Reservoir.

Coordination with applicable regulatory agencies was a critical component of the Demonstration Project.

CDPH has authority to approve reservoir augmentation projects on a case-by-case basis. An additional goal of the Demonstration Project was to facilitate concept approval from CDPH for a reservoir augmentation project at San Vicente Reservoir. The City submitted a proposal to CDPH in March 2012 that presented specific public health protections provided by a reservoir augmentation project at San Vicente Reservoir and summarized technical study results obtained throughout the Demonstration Project and validated by the IAP (City of San Diego, 2012d). The City's proposal, provided in Appendix A, articulated how a reservoir augmentation project at San Vicente Reservoir would provide a robust, multiple barrier approach fundamental to public health protection by incorporating the following elements:

- **Enhanced source control** to prevent potential contaminants from entering the wastewater stream
- **Control of pathogens** (potential disease-causing organisms such as viruses, bacteria, protozoa, and fungi) through the use of existing recycled water treatment and implementation of advanced water purification processes
- **Control of nitrogen compounds** through implementation of advanced water purification processes

- **Reliable removal of regulated contaminants and constituents of emerging concern**, achieved through implementation of an advanced water purification process and monitoring plan focused on removal and frequent measurement of these constituents
- **Reliability and redundancy** to meet regulatory requirements and to prevent purified water from entering San Vicente Reservoir if necessary
- **Monitoring and response plan** designed to detect any unexpected operational issues at the full-scale AWP facility or source water contamination before the purified water reaches San Vicente Reservoir

Based on the multiple barrier approach outlined in the City's proposal, CDPH sent the City a Concept Approval Letter for a reservoir augmentation project at San Vicente Reservoir on September 7, 2012 (Appendix B).

The City also convened a series of meetings with the Regional Board throughout the Demonstration Project that focused on clarifying the Regional Board's regulatory framework for permitting a reservoir augmentation project at San Vicente Reservoir. On October 12, 2011, the Regional Board adopted Resolution No. R9-2011-0069 (provided as Appendix C), which documented the Regional Board's support for a reservoir augmentation project at San Vicente Reservoir. The resolution also established that the Regional Board would regulate the City's project at San Vicente Reservoir through an NPDES permit. In August 2012 the City submitted to the Regional Board a document entitled *Proposed Regional Water Quality Control Board Compliance Approach,* provided as Appendix D (City of San Diego, 2012e). This document summarizes the City's potential reservoir augmentation project at San Vicente Reservoir, identifies key permitting issues, and proposes a regulatory pathway that the Regional Board could follow to approve a full-scale project at San Vicente Reservoir. The Regional Board, working together with the EPA, reviewed the City's submittal and acknowledged in a February 2013 letter that an NPDES permit could be issued for a reservoir augmentation project at San Vicente Reservoir based on the City's preferred regulatory pathway. That letter, provided in Appendix E, also acknowledged both the Regional Board's and EPA's strong support for the City's efforts in considering a full-scale reservoir augmentation project at San Vicente Reservoir.

Key findings from the regulatory coordination effort include:

- The combination of advanced water purification technology and San Vicente Reservoir conditions would provide the necessary safeguards to make reservoir augmentation feasible from a regulatory perspective.
- Regulatory acceptance of the City's Demonstration Project was validated through a Concept Approval letter from CDPH and a Resolution of Support and Letter of Concurrence from the Regional Board.

Public Outreach and Education

The public outreach and education program for the Demonstration Project was a continuation of outreach efforts that started with the Water Reuse Study, building on the foundation laid during that study. A strategic outreach plan was developed at the outset of the Demonstration Project to guide the continuation of this program. Throughout the duration of the Demonstration Project, the City sought to ensure that information was presented in a clear, understandable, and accessible way to residents in all areas of the City. Information about the Demonstration Project was also provided through a variety of formats including direct contact with individuals, written and electronic materials, traditional and social media, group presentations, community events, and tours of the AWP Facility. Additional information on the public outreach and education program for the Demonstration Project can be found in the companion CD, which is Appendix H of this report. The following outreach activities were completed as part of the Demonstration Project:

- Developed the outreach plan
- Conducted research, including one-on-one stakeholder interviews
- Produced informational materials
- Assembled a speakers bureau composed of project team members and Public Utilities Department staff
- Created a presentation about the project for community groups
- Requested community group recommendations from City Council members to contact for presentation opportunities
- Conducted project presentations to community organizations, internal staff, the City's Independent Rates Oversight Committee (IROC) and Natural Resources & Culture Committee (NR&C)
- Participated in industry conferences
- Developed an email list database of individuals interested in the project
- Distributed eUpdates and electronic newsletters to interested parties
- Participated in community events
- Provided project information to a broad group of media representatives and outlets
- Compiled quarterly metrics reports and analyzed them to guide future outreach activities
- Launched the Urban Water Cycle Tour program, which culminated in AWP Facility tours
- Invited elected officials and project stakeholders to visit the AWP Facility when it began operation in mid-2011
- Developed informational materials, such as a virtual tour video, project white papers and a tour brochure
- Established a social media presence online using Facebook, Twitter, and YouTube
- Implemented continuous improvements in the AWP Facility tours based on feedback from tour guests
- Continuously enhanced the community presentations based on attendee feedback

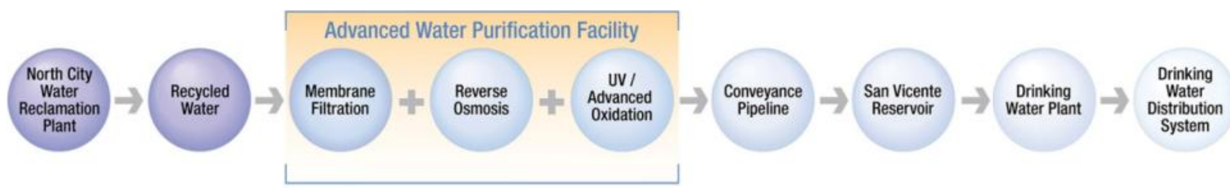
Key findings from the public outreach effort include:

- Feedback from more than 3,200 individuals who have toured the AWP Facility shows that providing an opportunity to tour the facility increases understanding about water purification processes.
- Survey research shows a steady increase from 2004 (26 percent) to 2011 (68 percent) to 2012 (73 percent) in City residents who favor using advanced treated recycled water as an addition to the City's drinking water supply.

Full-Scale Project Considerations

Potential implications of a full-scale project need to be well understood before a decision to implement such a project can be made. Full-scale project components evaluated during the Demonstration Project included source control enhancement, North City Water Reclamation Plant (North City) operations, full-scale AWP facility construction, pipeline system construction, environmental and regulatory permitting, economic and energy implications, and public outreach. Figure A-4 presents the components of a full-scale reservoir augmentation project at San Vicente Reservoir.

Figure A - 4: Components of a Multiple Barrier Reservoir Augmentation Project at San Vicente Reservoir



Full-scale project considerations include the following.

- **Source Control Enhancement:** The first barrier in the City's multiple barrier approach to water purification is source control, which is the prevention of contaminants from entering the wastewater stream processed at North City. The City already implements a robust Industrial Waste Control Program (IWCP) to protect wastewater treatment processes, recycled water quality, and coastal ocean resources as required by the Point Loma Wastewater Treatment Plant (Point Loma) discharge permit (refer to Section F for more information). The IWCP includes a pretreatment program for the City of San Diego and each of the 15 Participating Agencies, as well as other source control programs. Despite the extensive program currently in place, CDPH requires heightened vigilance and inclusion of residential and commercial programs in systems in which the purified water end product would enter the drinking water system. Orange County Sanitation District (OCSD) has implemented an enhanced source control program to support the GWRS. The City has reviewed that program and concluded that the following components would be appropriate enhancements to the City's existing IWCP, should the City pursue reservoir augmentation at San Vicente Reservoir.

- Develop a Chemical Inventory Program and Geographic Information System (GIS) Tracking system, which is an expanded industrial and commercial discharger chemical inventory database linked to discharger locations that are tracked using GIS software
- Implement a Pollutant Prioritization Program, which would involve prioritizing pollutants through sampling, characterizing constituents of emerging concern (CECs) at the full-scale AWP facility, and determining if pollutants can be controlled through targeted source control for individual dischargers or commercial sectors
- Perform an annual Local Limits Evaluation, which would consider including additional pollutants of concern on North City's list of local limits, and potentially lowering the limit of pollutants already on the list

- **North City Water Reclamation Plant Operations:** The IAP noted that North City already has key reliability features, including conservative operating criteria and flow equalization, to support a reservoir augmentation project at San Vicente Reservoir.
- **Full-Scale AWP Facility and Pipeline System Components:** The City evaluated construction considerations for a potential full-scale AWP facility with a capacity of 18 mgd and an estimated average production of 15 mgd, including facility components; production capacity; site location and layout; system controls, reliability, and redundancy; and full-scale AWP facility costs. Average production (15 mgd) is expected to be slightly lower than maximum treatment capacity (18 mgd) because production will vary throughout the year due to routine maintenance requirements and seasonal fluctuations in recycled water demand. During periods of low recycled water demand, full production capacity maybe attained, while in months of peak recycled water demand, it will be less than capacity, averaging approximately 15 mgd on a year-round basis. The City completed a conceptual design study for the purified water pipeline system that would be needed to transport water from a full-scale AWP facility (located at North City) to San Vicente Reservoir. This conceptual design study reviewed potential pipeline alignments and pump station specifications. Capital costs for full-scale AWP facility and pipeline system construction, which reflect data and information developed as part of the Demonstration Project, are estimated to be approximately $370 million, with annual operations and maintenance costs estimated to be approximately $16 million per year. This corresponds to a unit cost of approximately $2,000/ AF. This estimate is consistent with the 2012 LRWRP, which estimated that a full-scale reservoir augmentation project at San Vicente Reservoir would cost approximately $2,100/AF, including initial capital and annual operating costs (and energy). This would result in an increase of approximately $6.87 to an average monthly residential water bill. However, the project would also result in approximately $1,000/AF in avoided wastewater costs, resulting in a net cost of approximately $1,000/AF. Projected costs are described in further detail in the AWP Facility and Pipeline System Costs portion of Section F.

- **Environmental and Regulatory Permitting:** The Demonstration Project documented the regulatory requirements associated with a reservoir augmentation project at San Vicente Reservoir. Required regulatory documentation would likely include an Environmental Impact Report (EIR) and an Environmental Impact Statement (EIS); CDPH permitting, which would include developing an Engineering Report, convening three CDPH-led public hearings to comply with Section 116551 of the Health and Safety Code - Augmentation of Source with Recycled Water, issuing CDPH Findings of Fact, and amending the City's Water Supply Permit by CDPH to acknowledge a change of source water; and Regional Board permitting, which would include issuing a tentative permit, holding a public hearing, and issuing the formal permit.
- **LRWRP Energy Analysis:** Energy usage was estimated for a reservoir augmentation project at San Vicente Reservoir through development of the City's draft 2012 LRWRP, which provides the City with a water resources strategy to meet future water needs through 2035. The full-scale reservoir augmentation project at San Vicente Reservoir evaluated in development of the draft 2012 LRWRP would require approximately 2,500 kilowatt hours per acre-foot (kWh/AF) of energy, and would produce approximately 1.0 metric tons of greenhouse gases/AF. By comparison, imported water requires a range of 2,000 kWh/AF to 3,300 kWh/AF of energy, depending on the blend of water from the Colorado River or the Bay-Delta in Northern California, respectively. This corresponds to a range of 0.8 to 1.3 metric tons of greenhouse gases/AF (City of San Diego, 2012c). Since 2003, the blend delivered to the Water Authority has averaged approximately two-thirds Colorado River and one-third water from the Bay-Delta. Future imported water energy consumption will vary depending on actual blend. However, for practical purposes, the reservoir augmentation project at San Vicente Reservoir energy consumption is equivalent to that of imported water.
- **Public Outreach and Education Program:** The City has conducted extensive public outreach and education to make City residents aware of the potential implications and benefits of reservoir augmentation at San Vicente Reservoir. Should the City decide to move forward with a full-scale project, the interest level of the general population would be expected to increase and comprehensive outreach and education would need to continue. It is recommended that, should the City decide to move forward with a reservoir augmentation project at San Vicente Reservoir, the outreach activities conducted during the Demonstration Project be continued.

Summary of Findings

Table A-4 summarizes the Demonstration Project components and findings.

Table A - 4: Summary of Demonstration Project Findings

Project Component	Key Findings
Convene an Independent Advisory Panel	The IAP unanimously concluded that a reservoir augmentation project at San Vicente Reservoir would be a landmark project in the acceptance and furtherance of indirect potable reuse and would contribute to the City of San Diego's water portfolio.
Design, construct, and operate a demonstration-scale advanced water purification facility at the North City Water Reclamation Plant	The AWP Facility was designed, installed, operated, and tested between 2010 and 2012. Purified water produced at the AWP Facility reliably met applicable water quality standards.
Conduct a study of San Vicente Reservoir to establish residence time and water quality parameters and conditions of purified water in the reservoir	Addition of purified water into San Vicente Reservoir would not affect natural reservoir conditions and would meet regulatory requirements.
	San Vicente Reservoir would provide significant dilution of purified water.
	The addition of purified water would not impair existing conditions of San Vicente Reservoir, and could improve nutrient-related water quality issues.
Perform an energy and economic analysis	The estimated capital and annual operational and maintenance costs for a reservoir augmentation project at San Vicente Reservoir are \$369 million and \$15.5 million/year, respectively. This equates to approximately \$2,000/AF, or an increase of approximately \$6.87 to an average monthly household water bill. These costs are consistent with the City's draft 2012 LRWRP, which projected a reservoir augmentation project at San Vicente Reservoir to cost approximately \$2,100/AF. In addition, the project would generate approximately \$1,000/AF in avoided wastewater management costs.
	The reservoir augmentation project at San Vicente Reservoir would require approximately the same amount of energy and produce approximately the same amount of greenhouse gas emissions compared to imported water supplies.
	All three of the highest ranked portfolios in the 2012 LRWRP included a reservoir augmentation project at San Vicente Reservoir as a common resource option.

Project Component	Key Findings
Define the state's regulatory requirements for a full-scale reservoir augmentation project at San Vicente Reservoir	Results from the AWP Facility and reservoir studies provided evidence that the combination of advanced water purification technology and San Vicente Reservoir conditions would provide public health and environmental safeguards that would make reservoir augmentation feasible from a regulatory perspective. Regulatory participation in all IAP meetings and working groups addressing all technical aspects of reservoir augmentation conducted throughout the Demonstration Project enabled the regulators to establish specific guidelines and regulatory pathways to permitting a reservoir augmentation project. CDPH issued a Concept Approval Letter in September 2012 acknowledging that a reservoir augmentation project at San Vicente Reservoir would meet CDPH requirements. The Regional Board issued a letter in February 2013 concurring with the recommended permitting pathway for a reservoir augmentation project at San Vicente Reservoir.
Perform a pipeline alignment study	Conceptual design identified preferred pipeline alignments and estimated capital and annual operations and maintenance costs for the conveyance system to be $225 million and $3.4 million per year, respectively
Conduct a public outreach and education program	Survey research shows a steady increase from 2004 (26 percent) to 2011 (68 percent) to 2012 (73 percent) of City residents who favor using advanced treated recycled water as an addition to the City's drinking water supply.
	Feedback from individuals who have toured the AWP Facility shows that providing an opportunity to tour the facility increases understanding about water purification.

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Section B: Advanced Water Purification Facility

Advanced Water Purification Facility Findings

- Comprehensive water quality program at the AWP Facility included more than 9,000 tests at various points in the treatment process for 342 different chemical constituents, microbial constituents, and water quality parameters. Water quality of the purified water was compared to regulatory limits, verifying that purified water met all applicable water quality standards. This comprehensive water quality testing shows that the purified water produced at the AWP Facility is very pure – approaching distilled water quality.
- Operational data gathered during the 12 month testing period verified continuous and daily monitoring of each water purification process can assure the integrity of the process and that only the highest quality water is produced.

The City recognizes the importance of developing a thorough understanding of the technology, operations, and quality of purified water prior to moving forward with construction of a full-scale AWP facility. In addition, CDPH required the City to demonstrate the ability of the water purification process to produce purified water suitable for addition to San Vicente Reservoir prior to issuing concept approval for a reservoir augmentation project at San Vicente Reservoir.

To this end, the City installed and operated a demonstration-scale facility, referred to as the AWP Facility. An integral component of the Demonstration Project, the AWP Facility generated valuable information that will aid the City in selecting specific process equipment, understanding the quality of water that would be produced by a full-scale AWP facility, securing regulatory approval, and estimating full-scale AWP facility costs, should the City decide to move forward with construction of a full-scale AWP facility.

The AWP Facility produced purified water using the same processes as a potential full-scale facility.

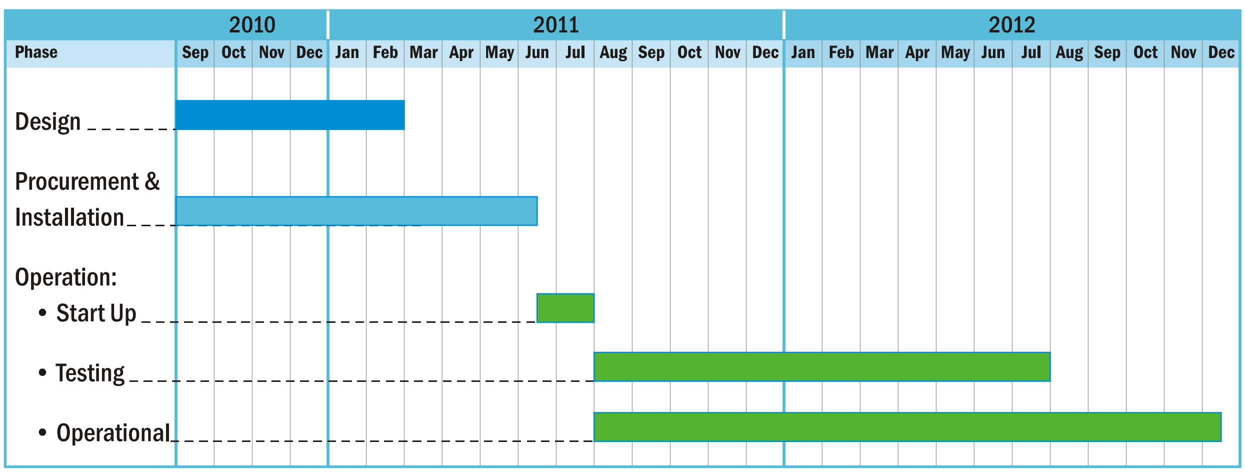
This section describes the characteristics and performance of the AWP Facility. Additional information on the AWP Facility can be found in AWP Facility Study Report (CDM Smith and MWH 2013a).

What is the AWP Facility?

The main purpose of the AWP Facility was to demonstrate the expected performance of a potential full-scale AWP facility prior to investing in and constructing the larger facility. Demonstration facilities such as the AWP Facility generate valuable information to guide full-scale facility planning and design, support permitting, and confirm the ability of potential full-scale facilities to meet project objectives.

The AWP Facility was designed, installed, operated, and tested between September 2010 and July 2012, as shown graphically in Figure B-1. AWP Facility start-up occurred over a one-and-a-half month period (mid-June 2011 through the end of July 2011), and facility testing spanned the following one year (August 2011 through July 2012). This section summarizes results and conclusions from that test period. Although the testing period is complete, the AWP Facility continues to operate for public tours and to gather additional equipment performance data. More information on public tours conducted at the AWP Facility is included in Section E.

Figure B - 1: AWP Facility Schedule



The AWP Facility produces one mgd of purified water using the same process components and multiple barrier strategy as those currently implemented at the 70 mgd GWRS, which has been operated by the Orange County Water District since 2008.

The AWP Facility provided a venue for conducting tours and educating the public on water purification processes. The facility layout accommodated public viewing and included signage and other visual aids to explain the water purification processes.

The water treated by the AWP Facility was recycled water from North City. No purified water was sent from the AWP Facility to San Vicente Reservoir during the Demonstration Project. All purified water produced at the AWP Facility was returned to the existing North City recycled water system and used for irrigation and industrial purposes.

The Water Purification Process

The AWP Facility was designed in accordance with industry standards for water purification processes established by CDPH in the Groundwater Replenishment Reuse Draft Regulation (CDPH, 2008). CDPH-specified process components included membrane filtration, reverse osmosis, and UV disinfection/advanced oxidation. Each process element is described below.

- **Membrane Filtration:** Membrane filtration is the first step in the water purification process. Water is passed through a material called a membrane, which has openings or "pores" that are large enough for water to pass through, but small enough to prevent particles such as suspended solids, bacteria, and protozoa from passing through.

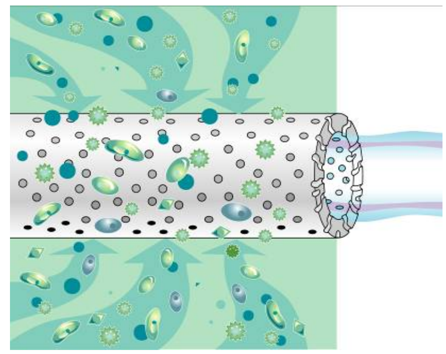
  

  Illustration of membranes used for the membrane filtration process

  The AWP Facility included two types of membrane filtration: microfiltration and ultrafiltration. The microfiltration system had a nominal pore size of 0.1 microns. This means that any contaminants greater than 0.1 micron in size (approximately 300 times smaller than the diameter of a human hair) were removed from the purified water in the microfiltration process. The ultrafiltration process had a nominal pore size of 0.01 microns, meaning that any contaminants greater than 0.01 micron in size (approximately 3,000 times smaller than the diameter of a human hair) were removed.

- **Reverse Osmosis:** The second step in the water purification process, reverse osmosis, is a common water treatment process that is used in many industries to produce purified water. In reverse osmosis, water is forced under pressure through membranes capable of separating extremely small molecules, including salts, viruses, pesticides, and most organic compounds from water. Reverse osmosis produces water that is similar in quality to distilled water. The AWP Facility included two side-by-side reverse osmosis systems, enabling the City to compare the performance of equipment from two manufacturers and two system configurations.

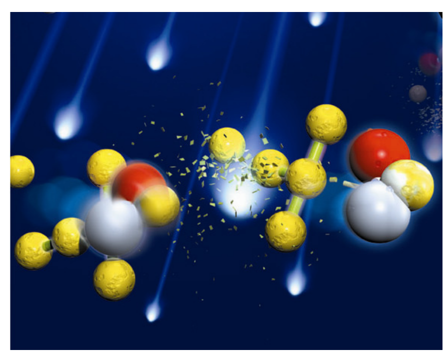
  

  Illustration of UV light photons and hydroxyl radicals breaking up, and effectively destroying, trace contaminants in water.

- **UV Disinfection/Advanced Oxidation:** UV disinfection/advanced oxidation is the third step in the water purification process, providing both the primary disinfection step and a second barrier to chemical compounds. In this step, hydrogen peroxide, which is a common household disinfectant, is added to the purified water. The purified water is then exposed to UV light, which is similar to concentrated sunlight. UV light is a powerful disinfectant that is commonly used to disinfect medical and dental equipment.

Advanced oxidation is achieved when UV light breaks chemical bonds and converts hydrogen peroxide into reactive particles known as hydroxyl radicals. These hydroxyl radicals destroy low molecular weight contaminants such as 1,4-dioxane that are known to penetrate the reverse osmosis membrane. In this way, advanced oxidation destroys trace contaminants that may have passed through the reverse osmosis process. The hydroxyl radicals are combined into other molecules in this process and do not persist in the purified water.

AWP Facility Testing Approach

A formal Testing and Monitoring Plan was prepared at the outset of the Demonstration Project with oversight and input from both the IAP and regulatory agencies (CDM and MWH, 2011a). This comprehensive Testing and Monitoring Plan was designed to achieve the following objectives:

1. Validate the overall performance of the water purification process in meeting regulatory requirements.
2. Demonstrate that continuous and daily monitoring of each water purification process can assure the integrity of the process and that only the highest quality water is produced.

AWPFacility Purification Process

The AWP Facility purification process included membrane filtration, reverse osmosis, and ultraviolet disinfection/advancedoxidation This purification process is being successfully used by multiple other projects currently operating in California, including Orange County's GWRS.

Step 1: Membrane Filtration

Step 2: Reverse Osmosis

Step 3: Ultraviolet Disinfection/Advanced Oxidation

Water quality constituents, which are dissolved chemical compounds or suspended materials that may be present in water, were identified for testing and monitoring based on regulatory standards and guidance provided in the following documents:

- Standard water quality criteria established for drinking water (primary and secondary maximum contaminant levels) (EPA, 2009)
- CDPH Drinking Water Notification Levels (CDPH, 2010)
- EPA Total Coliform Rule (EPA, 1989)
- CDPH Groundwater Replenishment Reuse Draft Regulation (CDPH, 2011)
- Environmental Protection Agency California Toxics Rule National Recommended Water Quality Criteria pertaining to aquatic life and human health (EPA, 2000)
- Regional Board Basin Plan Water Quality Objectives (Regional Board, 1994)
- State Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Board, 2005)
- State Board Monitoring Strategies for Chemicals of Emerging Concern in Recycled Water (State Board, 2010)

In total, more than 9,000 laboratory tests were conducted on 342 chemical constituents, microbial constituents, and water quality parameters. The samples collected at the AWP Facility were analyzed by certified outside laboratories. A quality assurance/quality control program using multiple laboratories further verified sampling results.

Water Quality Results

Water quality samples of recycled water, imported water, and purified water were collected and analyzed on a quarterly basis during the 12-month testing period. More frequent samples were collected upstream and downstream of each of the process steps for constituents that indicated process performance (CDM and MWH, 2011a, CDM Smith and MWH, 2012a, CDM Smith and MWH, 2012b and CDM Smith and MWH, 2013b). As shown in Table B-1, purified water was tested for all regulated constituents and met all applicable regulations.

Table B - 1: Water Quality –Regulated Constituent Results

Regulations / Guidelines	Number of Constituents	Purified Water Results
California Department of Public Health Goals		
Primary Drinking Water Maximum Contaminant Levels (MCLs) [1]	90	Meets All Regulations
Secondary Drinking Water MCLs[2]	18	Meets All Regulations
Microbial[3]	4	Not Detected
Notification Levels[4]	30	Meets All Regulations
Groundwater Replenishment Criteria[5]	142	Meets All Regulations
State Board Goals for Reservoir Augmentation at San Vicente Reservoir (projected)		
San Vicente Reservoir Limits[6]	143	Meets All Regulations
Total[7]	**231**	

Footnotes:

1. Primary drinking water MCLs are enforceable, human health-based water quality limits.
2. Secondary drinking water MCLs are unenforceable water quality goals related to aesthetic water characteristics such as taste and odor. Purified water met all Federal and State Secondary MCLs with the exception of pH and corrosivity. The potential full-scale AWP facility would include post treatment to meet these requirements.
3. Total Coliform, Fecal Coliform, and Viruses (Somatic and Male Specific Bacteriophage)
4. Notification levels are drinking water quality advisory limits.
5. Groundwater Replenishment Criteria are water quality limits specifically developed for indirect potable reuse via groundwater replenishment.
6. Reservoir limits are EPA Numeric Criteria for Priority Pollutants and San Diego Basin Numeric Objectives.
7. Because some contaminants and parameters are in multiple regulations / guidelines the total of unique parameters is less than the sum.

Relevant unregulated constituents were also measured, including 30 constituents listed in the EPA Unregulated Contaminant Monitoring Rule 3, 90 CECs (pharmaceuticals, and other products typically found in treated wastewater), six nitrosamines, three radionuclides, and lithium.[3] Accounting for overlap, this totals 111 unique additional unregulated constituents. Of these, six constituents were detected in the purified water during at least one sampling event; that is to say, the constituent was detected at a level that the laboratory was able to determine a numerical concentration. In comparison, 21 constituents were detected in the imported aqueduct water during at least one sampling event.

The six constituents detected in the purified water are: Bromochloromethane, used in fire-extinguishing fluid; Chromium (VI), formed by oxidation of chromium (III) in the advanced oxidation process; Strontium, a naturally occurring metal and dietary supplement; Acesulfame-K, a widely used artificial sweetener; Iohexal, a contrasting agent used in X-ray procedures; and

[3] The Unregulated Contaminant Monitoring Rule 3 (UCMR 3) was signed by EPA Administrator, Lisa P. Jackson on April 16, 2012. UCMR 3 will require public water systems to monitor for up to 30 potential drinking water contaminants. Additional information can be found at: http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/index.cfm

Triclosan, an antibacterial agent used in hand soap and toothpaste. Since these non-regulated constituents do not have regulatory limits, the best way to determine the significance of measured concentrations is to compare them to the constituent's Drinking Water Equivalent Level (DWEL) or the EPA indentified Health Reference Level. The DWEL and Health Reference Levels both represent an acceptable concentration in drinking water assuming an average person consumes two liters of water per day for 70 years. The measured concentration of these six constituents in the purified water were 10 million times to 18 times lower than associated DWELs and Health Reference Levels.

In general, water quality testing shows that the purified water is approaching distilled water purity. For example, TDS (a measure of salt content) in the purified water is about 15 mg/L, compared to TDS in San Diego's source water and drinking water of about 500 mg/L. As a second example, TOC (a measure of carbon that is bound in organic molecules) in the purified water is about 0.1 mg/L compared to a TOC of 3.0 mg/L in San Diego's source water and 2.5 mg/L in San Diego's drinking water (City of San Diego, 2012a, City of San Diego, 2012g).

For detailed information regarding water quality and other data collected and analyzed for the Demonstration Project, please refer to Quarterly Testing Report No. 4 for the AWP Facility, which is included in the References section of this Project Report.

Integrity Testing and Monitoring

Verifying the integrity and reliability of each water purification process was critical to assure that only the highest quality water is produced by the AWP Facility. Integrity testing uses both mechanical tests and routine water quality sampling to verify that equipment is functioning properly. Integrity monitoring consists of continuous and daily measurements at critical points in the treatment process. During the 12-month testing period, a critical control-point monitoring plan was implemented to identify any changes in performance of the treatment processes that could adversely impact final water quality. Examples of the techniques used to assure reliable performance are illustrated in Table B-2.

Integrity testing and water quality monitoring confirmed that the advanced water purification processes are functioning properly.

Integrity monitoring and critical control point monitoring showed that the AWP Facility equipment remained intact, met the intended treatment performance on a continuous basis, and was reliable throughout the operational period (CDM and MWH, 2013a). During the design phase of a full-scale AWP facility, the City would develop a similar online monitoring and response plan to provide sufficient features and assurances that any foreseeable malfunction could be promptly identified and appropriate responses promptly applied. Overall, the results of both integrity testing and monitoring verified that the purification processes met their intended treatment performance levels on a continuous basis.

Table B - 2: Summary of Advanced Water Purification Process Integrity Monitoring

Critical Control Point	Critical Limit Parameter	Monitoring Frequency	Results
Membrane Filtration	Pressure Decay[1]	Once per day	Results showed that both membrane filtration systems remained intact over the testing periods.
Reverse Osmosis (RO)	TOC[2], Conductivity[3]	Continuous[4]	Both RO systems achieved consistent conductivity rejection, and nearly six months of online TOC monitoring showed the combined RO permeate TOC was consistently below the maximum acceptable level of 0.1 mg/L.
UV Disinfection	Reactor Power Level	Continuous	When any of the 72 lamps or 36 ballasts failed, system alarms and power levels adjusted as programmed, and water quality was not affected.
UV Disinfection/ Advanced Oxidation	Hydrogen Peroxide Dose Rate/ Continuous Flow Confirmation	Once per day by draw down Continuous flow confirmation	

1. Pressure Decay: The operational integrity of membrane filtration systems can be tested by a pressure decay test, which measures the rate of pressure decay (drop) across a membrane over a specified period of time. A sharp drop in pressure can alert operators to a potential defect or leak in the membrane filtration system.
2. TOC is the amount of carbon present in the water, and includes all natural and man-made organic chemicals.
3. Conductivity is the ability to conduct or transmit electricity. Conductivity of water increases with the concentration of dissolved ions, so measuring conductivity provides a measure of the concentration of dissolved ions in water.
4. The term “continuous” may also apply to measurements that are taken frequently (example: every four minutes) and automatically whenever the process is in production.

Performance Indicator Monitoring

The AWP Facility testing also included performance indicator monitoring to determine if any constituents could be used to indicate the treatment efficiency of the reverse osmosis and UV/advanced oxidation processes. Many of the constituents monitored at the AWP Facility were removed by the reverse osmosis to levels at or below quantifiable limits, demonstrating strong performance of the reverse osmosis process. Therefore, identifying usable performance indicators to accurately measure advanced oxidation removal was a challenge.

Sixteen constituents were monitored as performance indicators, and removal generally exceeded 95 percent within the reverse osmosis process when sufficient quantities were present to calculate removals. In some cases, greater than 99.9 percent removal was observed.

Indicator compounds, such as TOC (a measure of carbon bound in organic molecules), conductivity (ability to conduct electricity which corresponds to salt content), monochloramines (a mild disinfectant used to prevent microbial growth in drinking water), and UV 254 (a measure of absorbance of light of a particular wave length as it passes through water), may prove to be more reliable as CEC removal performance indicators due to their ease of measurement and their reliable presence in the water downstream of both the reverse osmosis and advanced oxidation processes. For the reverse osmosis process, the average removal results were: TOC - 99.6 percent, conductivity - 99.0 percent, and UV254 - 88.8 percent. For the advanced oxidation process, the average removal results were: UV254 - 68.7 percent and monochloramines - 72.8 percent.

Operational Performance

The AWP Facility became fully operational on June 16, 2011. The operation and testing results were presented in quarterly reports over the operating period as summarized in Table B-3 (CDM and MWH, 2011b, CDM and MWH, 2012a, CDM and MWH, 2012b, CDM and MWH, 2013b).

Table B - 3: Operation and Testing Schedule

Testing Period	Testing Quarter	Operating Period		Report Date
		Test Period Start	Test Period End	
1	Quarter 1	6/16/2011	10/31/2011	December 2011
2	Quarter 2	11/1/2011	2/10/2012	March 2012
3	Quarter 3	5/11/2012	5/14/2012	June 2012
4	Quarter 4	5/15/2012	7/31/2012	September 2012

The following subsections summarize the operational specifics of the membrane filtration, reverse osmosis, and UV disinfection and advanced oxidation systems (CDM and MWH, 2013a).

Membrane Filtration

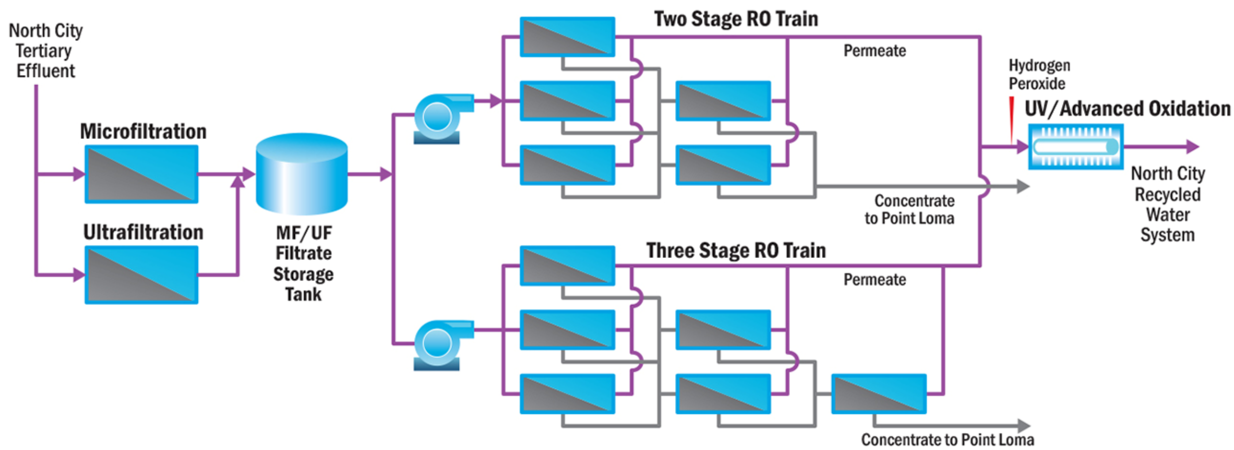
The membrane filtration equipment used at the AWP Facility included two parallel systems, each treating half of the recycled water entering the AWP Facility. One system used microfiltration membranes, while the second system used ultrafiltration membranes. Although both systems were expected to efficiently remove suspended solids, bacteria, and protozoa as the first step in the multiple barrier process, the smaller pore size of ultrafiltration membranes was expected to provide better removal, but with higher energy usage. Side-by-side testing was performed to determine the feasibility of using either microfiltration or ultrafiltration systems for the full-scale AWP facility. More membrane selection options will allow for more competitive bids on full-scale equipment.

Water quality data demonstrated that both systems consistently produced purified water that met water quality objectives for target constituents. Microbial monitoring confirmed that both membrane systems provide a substantial barrier to pathogenic organisms. Both membranes removed more than 99.9 percent of bacteria and more than 99 percent of viruses. The ultrafiltration membranes provided an increased level of protection against the smallest pathogenic organisms (viruses) due to its smaller pore size. The side-by-side testing showed that the smaller pore size on the ultrafiltration membrane did not result in higher pressure/energy requirements.

Reverse Osmosis

Two reverse osmosis configurations, a two-stage configuration and a three-stage configuration, were tested (shown in Figure B-2). The different configurations were tested to identify any operating advantages that one configuration may have over the other. The two-stage and three-stage configurations were tested at both an 80 percent and an 85 percent recovery rate, where recovery rate refers to the percentage of upstream flow that remains in the downstream flow after the reverse osmosis step. Existing AWP facilities in California typically operate at an 85 percent recovery rate, with approximately half of the plants using two-stage configurations and half using three-stage configurations. The testing showed that both the two-stage and three-stage reverse osmosis configurations could reliably operate at 85 percent recovery. The three-stage configuration did not offer the improved system hydraulics that were anticipated.

Figure B - 2: Reverse Osmosis Configurations Tested at the AWP Facility



Water quality testing of the reverse osmosis membranes focused primarily on expected differences in nitrogen, a nutrient of concern for San Vicente Reservoir. Both reverse osmosis configurations exhibited similar water quality performance. Specifically, both systems showed similar ability to remove salts and nitrates and produced purified water that would meet or exceed regulatory requirements.

The three-stage configuration required eight percent more energy than the two-stage configuration. Based on operational performance, the two-stage configuration provided the basis for a full-scale AWP facility layout and cost estimation conducted as part of the Demonstration Project.

Because reverse osmosis uses semi-permeable membranes that only let the smallest molecules pass through, it requires more pressure and energy than the other treatment processes. Both reverse osmosis configurations were equipped with energy recovery devices designed to optimize the overall energy use of the reverse osmosis system. Energy recovery devices are designed to recover energy between reverse osmosis stages, minimizing energy requirements. Specifically, these devices transfer pressure (and associated energy to create pressure) from one reverse osmosis stage to another, thereby reducing the amount of pressure and energy required for each stage. The energy recovery devices tested for the reverse osmosis process demonstrated that these devices performed successfully and resulted in an eight percent overall energy reduction for the two-stage configuration. The full-scale energy savings with energy recovery devices was assumed to be four to seven percent.

Concentrate produced by the reverse osmosis system would be discharged to Point Loma. Ocean discharges from Point Loma have decreased in recent years, and currently average approximately 150 mgd to 160 mgd. At a recovery rate of 85 percent, a reservoir augmentation project at San Vicente Reservoir producing 15 mgd (average production) of purified water would generate approximately 2.6 mgd of concentrate. This would constitute approximately 1.9 percent of the total Point Loma flow, increasing the TDS of the Point Loma ocean discharge by approximately 100 mg/L – which would not have any insignificant effect.

UV Disinfection and Advanced Oxidation

During the testing period, the UV disinfection and advanced oxidation system, which includes UV light and hydrogen peroxide, was operated to achieve specific removals of n-nitrosodimethylamine (NDMA) and 1,4-dioxane. These chemicals are used by CDPH as indicator compounds to assess the performance of advanced oxidation since both are difficult to remove and the ability of a process to achieve removal indicates that the process provides a robust barrier to a wide array of chemicals. Although NDMA concentrations are extremely low in North City recycled water as compared to other recycled water sources throughout California and nationwide, percent removal can still provide an indication of advanced oxidation system performance.

Performance results demonstrated that, with an adequate amount of hydrogen peroxide and power applied to the UV system, sufficient contaminant removal was achieved to meet regulatory requirements. Because the excellent disinfection capability of UV/advanced oxidation systems has been well established by other full-scale operations (such as the Orange County GWRS), there was no need to test this system's disinfection performance as part of the Demonstration Project. Specifically, deactivation of 99.9999 percent of viruses has been demonstrated for this process operating under similar conditions. Throughout the testing period, the UV/advanced oxidation process achieved the target NDMA and 1,4-dioxane removal rates defined by CDPH (CDPH, 2008; CDPH, 2011).

AWP Facility Findings

Key findings of the AWP Facility include the following.

- The water quality testing and monitoring program at the AWP Facility included more than 9,000 tests at various points in the treatment process and imported water aqueduct for 342 different water quality constituents and microbial parameters. Water quality of the purified water was compared to regulatory limits, verifying that purified water met all applicable water quality standards. Further, this comprehensive water quality testing shows that the purified water is pure, approaching distilled water purity.
- It was demonstrated that continuous and daily monitoring of each water purification process can assure the integrity of the process and that only the highest quality water is produced.

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Section C: San Vicente Reservoir Study

San Vicente Reservoir Study Findings

- The addition of purified water into San Vicente Reservoir would not affect natural hydrologic characteristics of the reservoir, seasonal stratification, or mixing. This finding demonstrates that the addition of purified water would not affect the natural blending and retention in the reservoir.
- Blending and retention of purified water in San Vicente Reservoir would constitute a substantial environmental barrier, sufficient to meet regulatory requirements.
- For all anticipated reservoir operating scenarios and purified water release locations, the reservoir would dilute the purified water by at least a factor of 200 to one at all times.
- The addition of purified water would not substantially affect water quality in San Vicente Reservoir. The dam raise and reservoir expansion, which is independent of the Demonstration Project, will improve overall water quality in the reservoir by reducing nutrients including nitrogen compounds that cause water quality issues, and the addition of purified water will not change these improvements. Addition of purified water would improve some aspects of reservoir water quality, such as reducing salt concentration.

Regulatory agencies require that a substantial environmental buffer, either a groundwater basin or a surface water reservoir, serve as a receptacle for purified water prior to blending into the drinking water system. As recommended as part of the Water Reuse Study, San Vicente Reservoir would provide that environmental buffer if the City were to implement a reservoir augmentation project at San Vicente Reservoir.

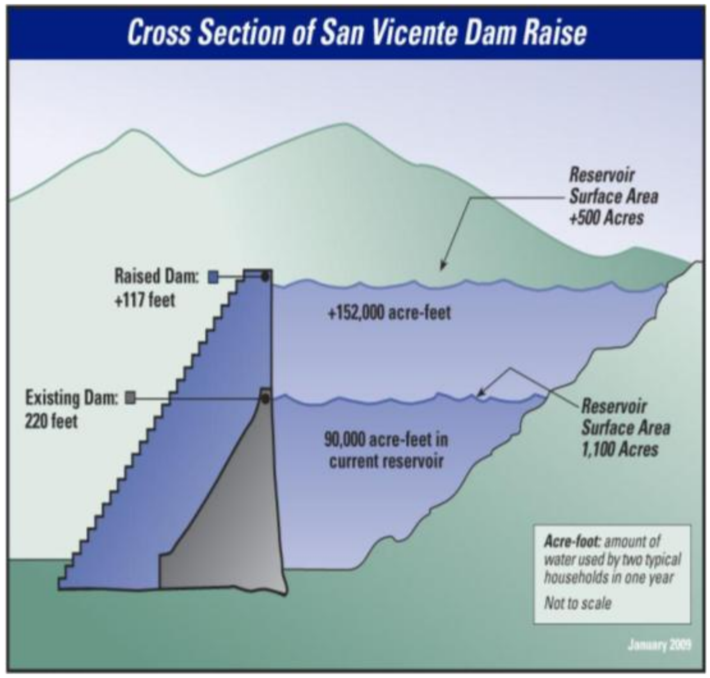
This section describes the San Vicente Reservoir setting, the regulatory considerations for reservoir operation, the reservoir analysis conducted as part of the Demonstration Project, and the results of the reservoir modeling.

The Demonstration Project included an in-depth study of San Vicente Reservoir.

San Vicente Reservoir: A Key Component of San Diego's Water Supply System

San Vicente Reservoir, located near Lakeside, was created by a dam built in

1945 that impounds San Vicente Creek. San Vicente Reservoir is owned and operated by the City's Public Utilities Department and is predominately used for municipal water supply purposes. The reservoir stores imported water, collects local runoff from a 75-square-mile watershed, and stores water transferred from Sutherland Reservoir. San Vicente Reservoir also supports limited recreational activities including boating, fishing, and water skiing.



Historically, San Vicente Reservoir has supplied water to the Alvarado Water Treatment Plant. As part of the Water Authority's Emergency Storage Project, San Vicente Dam is being raised, resulting in an increase in reservoir capacity from 90,000 AF to approximately 247,000 AF. The San Vicente Dam Raise Project will be complete by spring 2013, with refill of the reservoir expected to take three to five years, depending on the availability of imported water. As part of the Emergency Storage Project, new pipelines have been constructed to allow San Vicente Reservoir to receive imported water from the western leg of the regional aqueduct system. San Vicente Reservoir will continue to primarily supply the Alvarado Water Treatment Plant through the City's existing pipelines. The new conveyances of the Emergency Storage Project will also allow water to be sent to other water treatment plants serving all of the City and the entire southern two-thirds of the San Diego region.

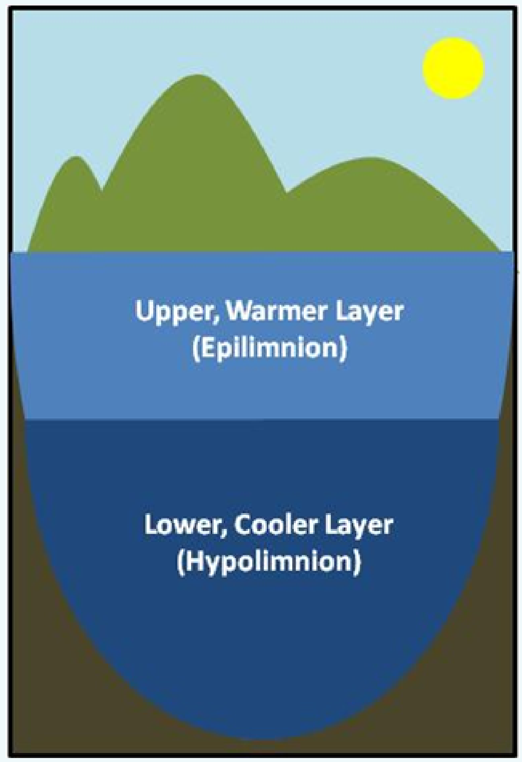
San Vicente Reservoir has historically served as an integral component of the City's water supply system. These improvements further solidify the role of San Vicente Reservoir in the region's overall water supply operation, including the ability for the reservoir to play a role in a potential future reservoir augmentation project.

Why Consider San Vicente Reservoir for Reservoir Augmentation?

Purified water produced at the City's AWP Facility has been validated through robust testing as meeting applicable water quality requirements; however, regulatory agencies would require a reservoir augmentation project at San Vicente Reservoir to include an environmental buffer capable of providing adequate retention time and blending of purified water. As described in detail in Section D, Regulatory Coordination, retention time and blending criteria are part of what is known as a multiple barrier approach, which is required by regulatory agencies to ensure that adequate safeguards are in place to protect public health in the event of an unexpected issue with the purified water.

San Vicente Reservoir is an ideal feature for reservoir augmentation because, in addition to having sufficient storage available to accommodate purified water flows throughout the year, it has unique characteristics that assist in meeting regulatory requirements. Specifically, in addition to providing significant blending of purified water with other raw water sources, the reservoir's large capacity and stratification allow it to retain the purified water for a significant period of time before it is delivered for final treatment (refer to the stratification inset below for more information).

A Word About Reservoir Stratification



Reservoir stratification—the formation of "layers" of water within a reservoir—is a natural phenomenon that occurs in essentially all reservoirs in North America, including San Vicente Reservoir. Consistent and predictable stratification has been observed in more than 20 years of monitoring data collected from San Vicente Reservoir. During the period of stratification (approximately 10 months per year), warm water that is naturally heated by the sun is contained within the top-most layer of the reservoir (epilimnion), because warmer water is less dense than cooler water. The more dense, cooler water is contained within the lower layer of the reservoir (hypolimnion). When stratification occurs, the water and any dissolved or suspended constituents contained within the epilimnion do not readily mix with the water and constituents contained within the hypolimnion.

During winter months, the epilimnion cools in response to cooler air temperatures. This causes water temperature in the reservoir to equalize and the epilimnion and hypolimnion mix, causing the reservoir to lose its stratification (destratify). The fully destratified (mixed) condition lasts for a few weeks to a month and typically occurs in January, February, or March. The natural stratification and mixing of the reservoir is an important phenomenon, because it determines the extent and timing of mixing and retention provided by the reservoir.

Characteristics of San Vicente Reservoir that provide adequate retention time and blending features as required by regulatory agencies are described below.

- **Retention time.** The amount of time that purified water is retained in the reservoir, retention time, would provide time needed to monitor the purified water for water quality purposes—a step necessary to demonstrate that the purified water meets applicable water quality standards. San Vicente Reservoir's natural stratification, combined with a purified water release and withdrawal strategy that takes advantage of reservoir stratification (see stratification inset for more information), would provide purified water entering the reservoir with a substantial amount of retention time prior to withdrawal and final processing at a drinking water treatment plant and distribution to the City's drinking water system. Therefore, San Vicente Reservoir would be capable of providing adequate retention time as required by regulatory agencies as part of a multiple barrier approach that ensures the protection of public health.

- **Blending.** In addition to retention, the reservoir would provide significant blending, as a relatively small flow of purified water would be released into a large reservoir and blended with other reservoir water supplies prior to withdrawal. Once the San Vicente Reservoir expansion is complete, the reservoir volume will be 16 times greater than the projected annual purified water inflow of 15,000 AFY simulated.[4] This means that purified water would receive significant blending as it travels through the reservoir prior to being withdrawn and treated at a municipal drinking water treatment plant before flowing to the City's distribution system. Therefore, San Vicente Reservoir would be capable of providing adequate blending as required by regulatory agencies.

Under a reservoir augmentation project at San Vicente Reservoir, the City would augment San Vicente Reservoir with an annual average of 15 mgd of purified water. There would be seasonal variation in the amount of purified water produced at the full-scale AWP facility due to variations in the amount of recycled water available from North City, with winter monthly average inflows nearly twice as great as those seen in summer months. If the City were to implement a reservoir augmentation project at San Vicente Reservoir, the reservoir would continue to receive and store local runoff, water transferred from Sutherland Reservoir, and imported water. These water supplies would be blended with purified water, which is among the highest quality water available, prior to being treated at a drinking water treatment plant for delivery to the City's customers.

A reservoir augmentation project at San Vicente Reservoir would involve releasing purified water into the upper layer of San Vicente Reservoir. Because the purified water would be warm compared to the reservoir water and would flow into the reservoir at the surface, it would tend to remain in the upper layer of the reservoir. San Vicente Reservoir's outlet structure, located near the San Vicente Dam, has multiple ports to provide operators with flexibility when withdrawing water from the reservoir and sending it to a municipal drinking water treatment plant for treatment. Operators typically withdraw water for drinking water treatment and distribution from the deeper ports, where water quality is more consistent. Under stratified conditions, in which the upper and lower layers of the reservoir do not mix, purified water would be prevented from flowing directly to the outlet structure, providing a substantial retention time. During the relatively short period in which reservoir stratification would be lost, the reservoir would experience full and complete blending, so that any

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[4] 15,000 AFY was selected as a representative yield for the purposes of reservoir modeling based on previous estimates of project yield, including the Water Reuse Study. This production capacity is approximate to the 15 mgd production capacity now assigned to a full-scale project, and reservoir modeling results obtained during the Demonstration Project are representative of the results expected from a full-scale project.

purified water that were to flow to the outlet would first undergo extensive blending with reservoir water.

San Vicente Reservoir's Role in Assuring Public Health Protection

A reservoir augmentation project at San Vicente Reservoir would protect public health by encompassing multiple barriers to prevent pathogens and chemicals from being introduced into the drinking water supply. While a full-scale AWP facility would provide substantial barriers, and no pathogens or chemicals are expected to be present in the purified water entering San Vicente Reservoir, the reservoir would provide absolute assurance that no target pathogens or chemicals would enter the drinking water supply. This multiple barrier concept is illustrated in Figure C-1.

Figure C - 1: Pathogen and Chemical Removal by Multiple Barriers

		Advanced Water Purification Facility				
Effectively Removes	Secondary/ Tertiary Treatment	Membrane Filtration	Reverse Osmosis	UV Disinfection/ Advanced Oxidation	Reservoir Blending and Retention	Treatment at Drinking Water Treatment Plant
Pathogens	●	●	●	●	●	●
Chemicals	●		●	●		●

Modeling San Vicente Reservoir

To evaluate the potential retention and dilution provided by San Vicente Reservoir, a three-dimensional hydrodynamic computer model of San Vicente Reservoir was set up in order to:

- Determine the effectiveness of San Vicente Reservoir as an environmental buffer capable of providing blending and retention as required by regulatory agencies
- Evaluate any hydrodynamic changes, or changes to movement of water within the reservoir, resulting from introduction of purified water
- Determine whether addition of purified water to San Vicente Reservoir would affect water quality within the reservoir

What is a Three-Dimensional Hydrodynamic Computer Model?

"Hydrodynamics" is the movement of water. The three-dimensional model of San Vicente Reservoir is a computer-based model that simulates and predicts the movement of water in all three directions within the reservoir: up and down, left to right, and forward and back.

The three-dimensional modeling of San Vicente Reservoir used a pair of coupled computer models: the Estuary Lake and Coastal Ocean Model [ELCOM] and the Computational Aquatic Ecosystem

Dynamics Model [CAEDYM]. These models were originally developed at the University of Western Australia. An expert team applied the models for use on the Limnology and Reservoir Detention Study of San Vicente Reservoir. The expert team has experience with similar modeling efforts for Lake Mead in Nevada and for Los Vaqueros Reservoir, Lake Perris, Lake Hodges, and Olivenhain Reservoir in California, plus three previous modeling projects for San Vicente Reservoir.

The computer model was set up, calibrated, and validated using real-world data collected through the Demonstration Project and previous efforts. San Vicente Reservoir modeling initially began in the 1990s when two tracer studies were conducted to establish the reservoir's retention and blending characteristics. During these tracer studies, an inert material (referred to as a tracer) was released into the reservoir, and its movement was monitored to simulate how water particles move and travel throughout San Vicente Reservoir. The three-dimensional hydrodynamic modeling was validated with data from the tracer studies to determine how well the model analyzed known conditions of San Vicente Reservoir. Three-dimensional hydrodynamic modeling was conducted for a variety of reservoir operation conditions and climatic cycles, including wet years, droughts, varying inflows and outflows, and other factors. By comparing data collected during the tracer studies to model predictions, the model was refined to accurately predict the movement of water through the reservoir.

The model was used to focus on hydrodynamic characteristics such as retention time and blending, but included a water quality component, or subroutine. The hydrodynamic modeling analysis consisted of the following steps:

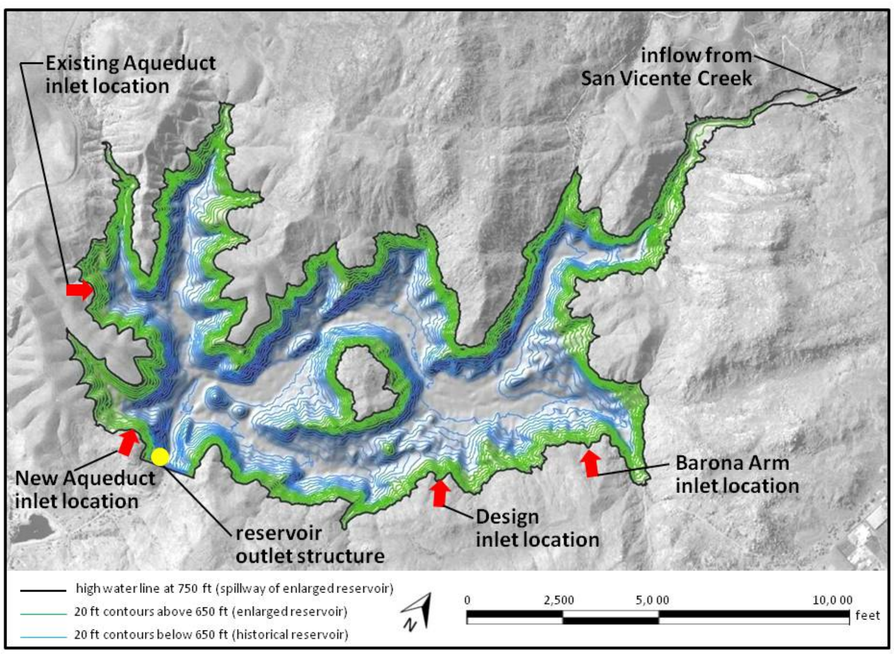
- Prepare a three-dimensional hydrodynamic model to simulate conditions in the old (90,000 AF-capacity) San Vicente Reservoir
- Use extensive historical reservoir water quality data and results from two tracer studies conducted in the late 1990s to calibrate and verify the accuracy of the three-dimensional hydrodynamic model
- Adjust the model to represent the expanded (247,000 AF-capacity) San Vicente Reservoir
- Conduct additional modeling to:
    - Assess the impact of adding purified water on the movement of water in the reservoir, including any potential implications on the formation and duration of the stratified layers
    - Assess the retention time and blending of purified water at various times of the year
    - Assess the impact of alternative purified water release locations on each of the above

The water quality component of the model was designed to simulate the potential effects of purified water on water quality in San Vicente Reservoir, specifically focusing on algae growth in the reservoir (Flow Science, 2010, Flow Science, 2012a, Flow Science, 2012b). Algal growth is the most important water quality factor affecting the use of the reservoir as a potable water supply, and also the most important water quality consideration for recreational uses. The water quality modeling analysis consisted of the following steps:

- Apply a water quality component to the three-dimensional hydrodynamic model
- Calibrate and verify the accuracy of the water quality component of the model using extensive historic reservoir water quality data
- Conduct model scenarios to compare water quality for three cases: 1) historic reservoir (90,000 AF), 2) expanded reservoir (247,000 AF), and 3) expanded reservoir with purified water added, compare physical parameters such as temperature and clarity, and nutrients for each case

Another key consideration in the reservoir modeling was the location where purified water would enter San Vicente Reservoir. The modeling effort involved testing four different potential locations to determine if the location of purified water entering the reservoir had an impact on water quality, retention, or blending. Figure C-2 illustrates these locations.

Figure C - 2: Potential Purified Water Inlet Locations



For the San Vicente Reservoir Study, Flow Science performed 18 separate runs of the three-dimensional hydrodynamic model. From these model runs, the project team–with input from the IAP–selected eight modeling scenarios for further assessment and analysis. Table C-1 summarizes the eight modeling scenarios. These modeling scenarios were selected because they represent the full range of purified water inlet locations and operational conditions that a reservoir augmentation project at San Vicente Reservoir could encounter. As such, the modeling effort captured the expected result of adding purified water to San Vicente Reservoir under all anticipated operating conditions. This modeling approach was a necessary step in the Demonstration Project to validate that San Vicente Reservoir will be able to meet regulatory requirements for retention time and blending under all conditions.

Table C- 1: Summary of Model Scenarios Completed

Model Scenario	Operating Scenario Simulated
1	**Base Case – Design Inlet Location:** reservoir under median expected storage and normal expected operations. Initial reservoir volume was 155,000 AF. Annual flow rates for Aqueduct inflow, runoff, purified water inflow, and dam withdrawal were 3,000, 4,500, 15,000, and 19,000 AFY, respectively. There were no water transfers from Sutherland Reservoir into San Vicente Reservoir. Purified water inlet was simulated at the Design Inlet Location, shown on Figure C-2.
2	**Base Case – Existing Aqueduct Inlet Location:** reservoir under median expected storage and normal expected operations. Initial reservoir volume was 155,000 AF. Annual flow rates for Aqueduct inflow, runoff, purified water inflow, and dam withdrawal were 3,000, 4,500, 15,000, and 19,000 AFY, respectively. There were no water transfers from Sutherland Reservoir into San Vicente Reservoir. Purified water inlet was simulated at the Existing Aqueduct Inlet Location, shown on Figure C-2.
3	**Base Case – New Aqueduct Inlet Location:** reservoir under median expected storage and normal expected operations. Initial reservoir volume was 155,000 AF. Annual flow rates for Aqueduct inflow, runoff, purified water inflow, and dam withdrawal were 3,000, 4,500, 15,000, and 19,000 AFY, respectively. There were no water transfers from Sutherland Reservoir into San Vicente Reservoir. Purified water inlet was simulated at the New Aqueduct Inlet Location, shown on Figure C-2.
4	**Base Case – Barona Arm Inlet Location:** reservoir under median expected storage and normal expected operations. Initial reservoir volume was 155,000 AF. Annual flow rates for Aqueduct inflow, runoff, purified water inflow, and dam withdrawal were 3,000, 4,500, 15,000, and 19,000 AFY, respectively. There were no water transfers from Sutherland Reservoir into San Vicente Reservoir. Purified water inlet was simulated at the Existing Barona Arm Inlet Location, shown on Figure C-2.
5	**No Purified Water Additions:** similar to Base Case, except there are no purified water additions and an equal reduction in reservoir outflow. Initial reservoir volume was 155,000 AF. Annual flow rates for Aqueduct inflow, runoff, and dam withdrawal were 3,000, 4,500, and 4,000 AFY, respectively. There were no water transfers from Sutherland Reservoir into San Vicente Reservoir.
6	**Extended Drought – Design Location:** hypothetical two-year drought where a large and constant volume of water is withdrawn monthly from the reservoir without importing additional water to refill the reservoir. Initial reservoir volume was 155,000 AF. Annual flow rates for Aqueduct inflow, runoff, purified water inflow, and dam withdrawal were 3,000, 4,500, 15,000, and 48,000 AFY, respectively. There were no water transfers from Sutherland Reservoir into San Vicente Reservoir. The volume of water stored in San Vicente Reservoir at the end of the simulation period was about 100,000 AF. Purified water inlet was simulated at the Design Inlet Location, shown on Figure C-2.
7	**Extended Drought – New Aqueduct Inlet Location:** hypothetical two-year drought

Model Scenario	Operating Scenario Simulated
	where a large and constant volume of water is withdrawn monthly from the reservoir without importing additional water to refill the reservoir. Initial reservoir volume was 155,000 AF. Annual flow rates for Aqueduct inflow, runoff, purified water inflow, and dam withdrawal were 3,000, 4,500, 15,000, and 48,000 AFY, respectively. There were no water transfers from Sutherland Reservoir into San Vicente Reservoir. The volume of water stored in San Vicente Reservoir at the end of the simulation period was about 100,000 AF. Purified water inlet was simulated at the New Aqueduct Inlet Location, shown on Figure C-2.
8	**Emergency Drawdown:** simulates a situation in which 66,000 AF of water is withdrawn from the reservoir in January and February of Year 2 and the reservoir is then refilled by adding 66,000 AF of water from the Aqueduct between March and July of Year 2. The rest of the flow rates are the same as the Base Case. Initial reservoir volume was 200,000 AF.

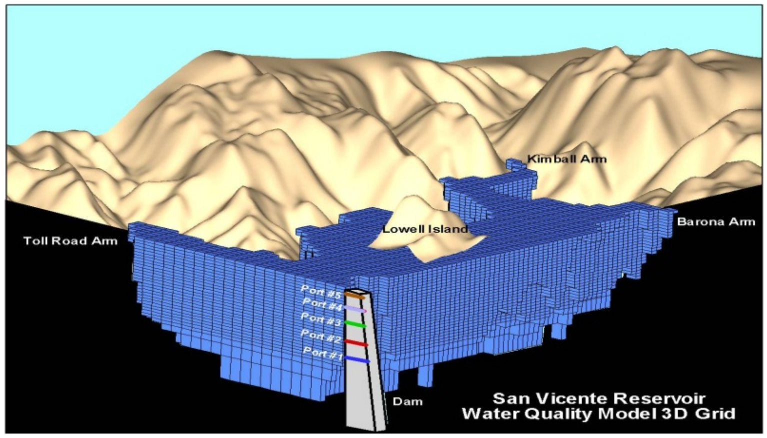
The reservoir model was set up in conjunction with regulatory entities including the Regional Board and CDPH, whose feedback was important to this process due to regulatory requirements for blending, retention, and water quality conditions. Model development and validation were also reviewed by the IAP. A dedicated subcommittee of the IAP was convened to review the model and associated data, and to provide comments to the City's reservoir modeling team throughout the reservoir modeling process. The IAP concluded that the model provides "an effective and robust tool" for assessing the effects of purified water on San Vicente Reservoir (NWRI 2010).

> ***"The Subcommittee (IAP Subcommittee for the San Vicente Reservoir Study) believes that the modeling is sufficiently predictive for purposes of evaluating the input of advanced treated recycled water (purified water)."***
>
> Findings and Recommendations of the Limnology and Reservoir Subcommittee (NWRI 2010)

San Vicente Reservoir Study Findings

Key findings of the San Vicente Reservoir modeling effort are:

- The addition of purified water into San Vicente Reservoir would not affect natural hydrologic characteristics of the reservoir, seasonal stratification, or mixing. This finding demonstrates that the addition of purified water would not affect the natural blending and retention in the reservoir.



The three-dimensional hydrodynamic model allowed the City to simulate potential effects of purified water on San Vicente Reservoir.

- Blending and retention of purified water in San Vicente Reservoir would constitute a substantial environmental barrier, sufficient to meet regulatory requirements.
- For all anticipated reservoir operating scenarios and purified water release locations, the reservoir would dilute the purified water by at least a factor of 200 to one at all times.
- As discussed in Section B: Advanced Water Purification Facility, the purified water produced at the AWP Facility was found to be very pure, approaching distilled water purity. The addition of purified water would not affect any aspect of water quality in San Vicente Reservoir. The dam raise and reservoir expansion, which is independent of the Demonstration Project, will improve overall water quality in the reservoir by reducing nutrients including nitrogen compounds that can stimulate algae growth and cause water quality issues, and the addition of purified water will not change these improvements. Addition of purified water would improve some aspects of reservoir water quality, such as reducing salt concentration.

Section D: Regulatory Coordination

Regulatory Coordination - Key Findings

- The combination of advanced water purification technology and San Vicente Reservoir conditions provide public health and environmental safeguards that make reservoir augmentation feasible from a regulatory perspective.
- Regulatory acceptance of the City's Demonstration Project was validated through a Concept Approval letter from the California Department of Public Health and a Resolution of Support and a letter confirming acceptability of the proposed regulatory pathway from the San Diego Regional Water Quality Control Board.

Prior to implementation, a reservoir augmentation project at San Vicente Reservoir would require approval by CDPH and the Regional Board. Neither CDPH nor the Regional Board has specific regulations in place for projects using purified water for reservoir augmentation, making the process for securing regulatory approval a challenge. A key objective of the Demonstration Project was to work closely with the regulatory agencies to identify appropriate requirements for a reservoir augmentation project at San Vicente Reservoir, and to determine whether a full-scale project incorporating water purification technologies and San Vicente Reservoir could meet these requirements.

Although reservoir augmentation at San Vicente Reservoir would use the same water purification processes as the Orange County GWRS, its regulatory pathway is less established. CDPH has established guidelines for groundwater augmentation projects such as the Orange County GWRS, but permits reservoir augmentation projects on a case-by-case basis.

This section describes regulatory conditions, including key considerations for each regulatory agency, the process used to identify regulatory requirements for a reservoir augmentation project at San Vicente Reservoir, and an assessment of the feasibility of a reservoir augmentation project at San Vicente Reservoir.

Regulatory Conditions

Projects in California that employ water purification processes are regulated by both CDPH and the State Board (administered by the local Regional Boards). To date, seven projects involving groundwater replenishment with purified water have been permitted in California, but no reservoir augmentation projects with purified water have been permitted or are operational statewide. Reservoir augmentation is practiced in other parts of the United States. For example, since 1978 the Upper Occoquan Service Authority has added recycled water into a stream above Occoquan Reservoir that supplies a drinking water treatment plant in Fairfax County, Virginia. The following sections discuss specific regulatory requirements for a reservoir augmentation project at San Vicente Reservoir.

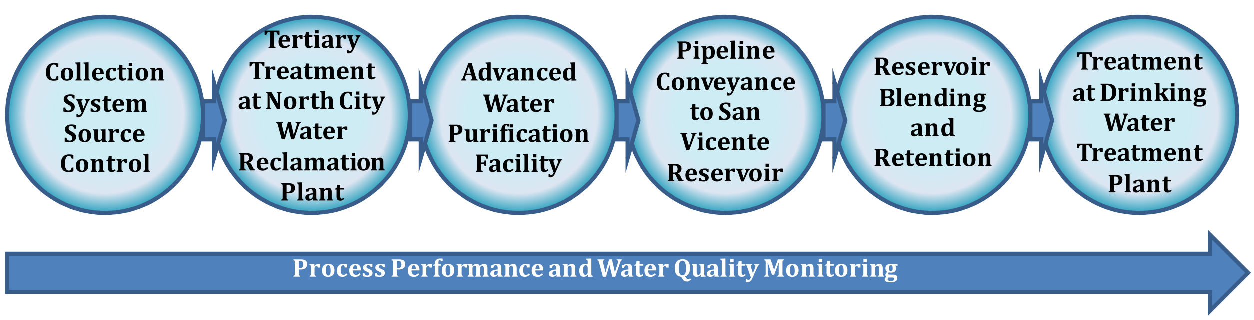
Protecting Public Health: California Department of Public Health

CDPH is responsible for developing and administering regulations to protect public health in California, including permitting public water supply projects. Because the City's reservoir augmentation project at San Vicente Reservoir would include augmentation of drinking water supplies, this project would require approval from CDPH (in the form of a permit) in order to operate.

State legislation passed in 2010 requires CDPH to finalize regulations by December 31, 2013 for projects using water purification for groundwater replenishment such as the Orange County GWRS. That same legislation requires CDPH to adopt regulations for reservoir augmentation projects by December 31, 2016. In advance of adopting regulations, CDPH can approve reservoir augmentation projects such as the City's potential reservoir augmentation project at San Vicente Reservoir on a case-by-case basis.

In order to ensure that public health is protected, CDPH requires that projects involving purified water incorporate a multiple barrier strategy. A multiple barrier strategy protects public health by incorporating safeguards into the process, which ensure that a failure or error at any given treatment step would not compromise public health. The public health safeguards that would be implemented in a reservoir augmentation project at San Vicente Reservoir are presented in Figure D-1, and described further in the following paragraphs.

Figure D - 1: Public Health Safeguards of the Potential Reservoir Augmentation Project at San Vicente Reservoir



Enhanced Source Control. The first step in the multiple barrier strategy for water purification is enhanced source control in the wastewater collection system, which refers to the prevention of contaminants from entering the wastewater stream. The City already operates a robust source control program focusing on controlling contaminants in industrial discharges upstream of North City (refer to Section F for more information). A reservoir augmentation project at San Vicente Reservoir would likely require the City to enhance that program by addressing commercial and residential discharges and focusing on preventing chemicals with potential public health implications from entering the collection system. Strategies to achieve this could include developing a Chemical Inventory Program and GIS Tracking System, implementing a Pollutant Prioritization Program, and performing an annual Local Limits Evaluation, as described in Section F.

Tertiary Treatment. This step would involve some or all of the processes that are already in place at North City to treat wastewater in accordance with Title 22 of the California Code of Regulations. Tertiary treatment produces what is commonly referred to as recycled water, suitable for irrigation and industrial purposes.

Advanced Water Purification Technology. CDPH requires that advanced water purification technology be incorporated into projects that augment the existing wastewater and recycled water treatment steps. Advanced water purification provides additional barriers to potential pathogens and chemical contaminants such as CECs. Advanced water purification technology produces purified water, which refers to recycled water that has been further purified so that it may be released into a groundwater basin or surface water reservoir that supplies water to a drinking water treatment plant (refer to Section B, Advanced Water Purification Facility for more information). A full-scale AWP facility associated with a reservoir augmentation project at San Vicente Reservoir would be located at North City.

Pipeline System Conveyance. Moving purified water from the advanced water purification facility, which would be located at North City, to the San Vicente Reservoir would require construction of a 22-mile extension to the City's existing recycled water system. At peak production capacity, it would take purified water at least 10 hours to travel to San Vicente Reservoir. In the unlikely event of a purification technology malfunction, this travel time would provide an opportunity to capture and divert purified water before it reached San Vicente Reservoir.

San Vicente Reservoir (Environmental Buffer). San Vicente Reservoir would serve as an "environmental buffer," or a natural water barrier that provides blending of purified water with other sources. San Vicente Reservoir would also provide substantial retention, meaning that it would retain purified water for an extended period of time prior to it entering the drinking water treatment plant. This would enable agencies to respond, should an unexpected problem occur in the upstream treatment processes (refer to Section C, San Vicente Reservoir Study for more information). CDPH requires that projects using water purification processes include an environmental buffer.

Drinking Water Treatment Plant. Purified water that is blended with other water sources in San Vicente Reservoir would be considered raw water, not yet suitable for drinking. Following retention in the reservoir, purified water would receive additional treatment at a drinking water treatment plant prior to public consumption. This would further protect public health by providing an additional barrier to potential pathogens or chemical contaminants. If the City were to implement a reservoir augmentation project at San Vicente Reservoir, this raw water would be treated at the Alvarado Water Treatment Plant or another municipal drinking water treatment plant.

Process Performance and Water Quality Monitoring. CDPH requires that a comprehensive and robust combination of water purification process performance monitoring, and monitoring of the purified water quality, be conducted to assure that all of the safeguards built into projects using water purification continuously function as planned.

CDPH would establish requirements for the City's potential reservoir augmentation project at San Vicente Reservoir through two permitting mechanisms.

- **Water Supply Permit:** The CDPH Water Supply Permit governing the existing drinking water system would need to be amended to include the additional source water (purified water) along with operating and water quality conditions specific to this new source.
- **National Pollutant Discharge Elimination System Permit:** CDPH would provide specific operating and water quality conditions to the Regional Board for inclusion in the NPDES permit discussed in the Regional Board section below.

Together, these operating permits would govern the advanced water purification technologies, operating features, resultant purified water quality requirements, and reservoir operating features providing redundant and reliable public health protections. Ultimately, a reservoir augmentation project at San Vicente Reservoir would need to meet not only drinking water quality standards applicable to all drinking water systems, but additional water quality standards intended to protect the health of aquatic organisms that may be present in the reservoir. Because some aquatic organisms may be more sensitive to certain water quality constituents than humans, some water purification standards are more stringent than conventional drinking water requirements.

Protecting Environmental Health: Regional Water Quality Control Board

The Regional Board is responsible for developing and enforcing water quality objectives for surface water and groundwater bodies within the San Diego region. Since the City's potential reservoir augmentation project at San Vicente Reservoir would involve releasing purified water into San Vicente Reservoir (the required environmental buffer), the project would fall under the jurisdiction of the Regional Board.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

The Regional Board is responsible for enforcing water quality objectives in the San Diego Region.

The Regional Board's existing regulatory framework is designed to manage the discharge of waste to the environment. Water purification technology has been demonstrated to remove "wastes" from recycled water, and statewide legislation (Assembly Bill 2398) was introduced in 2012 to remove purified water from the purview of the Regional Board to reflect the position that purified water should not be considered waste due to its exceptional quality. This omnibus legislation has since been tabled, but a stakeholder group is continuing this discussion with the ultimate goal of removing purified water from Regional Board purview. In the meantime, a reservoir augmentation project at San Vicente Reservoir would need to abide by the Regional Board's regulatory framework.

Because groundwater replenishment projects release purified water to groundwater as opposed to surface water, these projects typically require only a WDR permit issued by the Regional Board. The City's reservoir augmentation project at San Vicente Reservoir would involve releasing purified water to a surface water body and would, therefore, require a full NPDES permit, which is more involved than a WDR and includes EPA approval. An NPDES permit for the City's potential reservoir augmentation project at San Vicente Reservoir would place limitations on the purified water released to San Vicente Reservoir in accordance with the Basin Plan, which is the primary source of water quality standards for San Vicente Reservoir. These water quality standards are based on specific uses designated for San Vicente Reservoir. The Regional Board also regulates surface water bodies via the California Toxics Rule, which establishes water quality criteria for 126 priority pollutants. Together, Basin Plan standards and California Toxics Rule criteria provide a comprehensive set of water quality standards designed to protect the integrity and purpose of San Vicente Reservoir.

Regulatory Coordination Activities

The City began working closely with both CDPH and the Regional Board regarding potential reservoir augmentation at San Vicente Reservoir long before the start of the Demonstration Project. The City's Water Repurification Project, initiated in 1994 and formally stopped in 1999, included a regulatory coordination effort that culminated in the conceptual approval of reservoir augmentation at San Vicente Reservoir. New state policies and water quality concerns that emerged following that Water Repurification effort prompted the City to initiate new discussions with CDPH and the Regional Board during the Water Reuse Study. The City first met with both the Regional Board and CDPH in 2004-2005 during development of the Water Reuse Study. The City then met with CDPH in December 2007 to receive an update on the potential regulatory framework for reservoir augmentation at San Vicente Reservoir. Two things were concluded from that meeting:

- The City would need to demonstrate the performance of water purification technologies that would be used in reservoir augmentation at San Vicente Reservoir
- An IAP would need to be formed to oversee technical studies and review the findings as required by CDPH to form the basis for concept approval of a reservoir augmentation project at San Vicente Reservoir

Based on initial CDPH input, the City formulated a preliminary plan for the Demonstration Project, and met again with CDPH in March 2008 to present a proposed work plan for the Demonstration Project. The objective of this meeting was to clarify Demonstration Project objectives and obtain input on the City's proposed Demonstration Project work plan that formed the basis for the project scope and costs that develop the rate case. The City also coordinated with the County of San Diego Department of Environmental Health (DEH) at the request of CDPH; County DEH was invited to all meetings held with the IAP.

Preliminary conversations were also held with the Regional Board. After an initial meeting with Regional Board staff in 2008 to introduce the Demonstration Project concept, subsequent meetings of the IAP and its subcommittees included both regulatory agencies. Table D-1 summarizes the IAP meetings held in support of the Demonstration Project.

Based on initial meetings with CDPH and the Regional Board, a plan to achieve regulatory conceptual approval was developed. This plan provided the framework for regulatory activities that would ultimately lead to preliminary regulatory approval for a reservoir augmentation project at San Vicente Reservoir. This plan identified key technical topics that would need to be addressed and a schedule of regulatory and IAP meetings to address these topics. Topical IAP subcommittees and working groups were convened to support the amount and complexity of technical considerations to be addressed and provide input on specific work products for the Demonstration Project.

The Independent Advisory Panel validated results and conclusions of the Demonstration Project.

The regulatory plan was structured around the following regulatory objectives:

1. Validate the ability of the AWP Facility to produce purified water meeting all regulatory requirements
2. Demonstrate the ability of San Vicente Reservoir to provide a substantial environmental buffer year-round
3. Validate that the addition of purified water would protect San Vicente Reservoir water quality

Technical activities and regulatory and IAP subcommittee meetings were held throughout the Demonstration Project consistent with the regulatory implementation plan. The timing of specific Demonstration Project activities necessary to achieve the regulatory objectives is presented in Table D-1 through D-5.

Table D - 1: Summary of IAP Meetings

Meeting No.	Date	Topic
1	May 11-12, 2009	Introductory meeting for the full IAP to discuss the Demonstration Project Scope
2	March 29-30, 2010	Limnology (reservoir-related) Subcommittee Meeting No. 1 to discuss set-up and calibration of the San Vicente Reservoir Model[1]
3	September 2, 2010	Limnology Working Group Meeting No. 1 to specify and discuss details pertaining to the San Vicente Reservoir Model[2]
4	October 21, 2010	AWP Facility Subcommittee Meeting No. 1 to discuss the draft Testing and Monitoring Plan[3]
5	March 17, 2011	Limnology Working Group Meeting No. 2 to review San Vicente Reservoir modeling scenarios, determine potential "worst case scenarios," and discuss pathogen removal[2]
6	June 6-7, 2011	Second meeting of the full IAP to update the group on the Limnology Subcommittee, Limnology Working Group, and AWP Facility Subcommittee activities, and tour the AWP Facility
7	December 6, 2011	Limnology Subcommittee Meeting No. 2 to review and receive comments on the draft San Vicente Reservoir modeling study, and receive input on proposed reservoir public health-related regulatory conditions[1]
8	December 19, 2011	AWP Facility Subcommittee Meeting No. 2 to review AWP Facility operational and water quality data[3]
9	March 9-21, 2012	Conference calls to review and discuss Draft CDPH Proposal[4]
10	March 13, 2012	Limnology Subcommittee Meeting No. 3 to review the San Vicente Reservoir Water Quality Report[1]
11	November 15-16, 2012	Third meeting of the full IAP to review and comment on the draft Demonstration Project Report, Quarterly Testing Report No. 4, and AWP Facility Study Report (CDM Smith and MWH 2013b)

Footnotes:

1. The Limnology Subcommittee was comprised of four IAP members focused on the Limnology Study.
2. The Limnology Working Group was comprised of two IAP members and project staff specifically assigned to vetting the details of the reservoir study.
3. The AWP Facility Subcommittee was comprised of four IAP members focused on the operation and results of the AWP Facility.
4. An ad-hoc subcommittee provided review and comment via a series of conference calls in lieu of face-to-face meetings.

Objective 1: *Validate the ability of the AWP Facility to produce purified water meeting all regulatory requirements*[5].

A series of actions were taken between October 2010 and December 2012 to assist in validating the ability of the AWP Facility to produce purified water meeting regulatory requirements. Construction of the AWP Facility began in September 2010 and ran through June 2011. During construction, a detailed Testing and Monitoring Plan was developed and revised in coordination with the IAP prior to being submitted to CDPH for approval. Following CDPH approval and completion of AWP Facility construction, the Testing and Monitoring Plan was implemented. The monitoring results were summarized in a Draft AWP Facility Report, which was reviewed with the IAP prior to being submitted to CDPH. Together, these actions have demonstrated that the AWP Facility produces purified water meeting all regulatory requirements. CDPH issued concept approval for the project in September 2012. CDPH's Concept Approval Letter is included as Appendix B to this report. Table D-2 provides an overview of the timeline of each action implemented in support of Objective 1.

Table D - 2: Timeline of Activities Completed in Support of Objective 1

Activity	Date
Procure and Fabricate AWP Facility equipment	October 2010
Prepare Testing and Monitoring Plan	September 2010
Conduct IAP AWP Facility Subcommittee meeting No. 1	October 2010
Submit Testing and Monitoring Plan for CDPH approval	December 2010
Perform AWP Facility Testing	August 2011 – July 2012
Conduct IAP AWP Facility Subcommittee meeting No. 2	December 2011
Submit Concept Proposal for Full-Scale Reservoir Augmentation Project at San Vicente Reservoir to CDPH	March 2012
CDPH issues Concept Approval for Full-Scale Reservoir Augmentation Project at San Vicente Reservoir to CDPH	September 2012
Submit Draft AWP Facility Report for IAP review	October 2012
Submit AWP Facility Draft Quarterly Testing Report No. 4 to CDPH	October 2012

[5] For specific information regarding the AWP Facility, please refer to Section B of this report.

Objective 2: *Demonstrate ability of San Vicente Reservoir to maintain a substantial environmental buffer year-round.*[6]

Demonstrating that San Vicente Reservoir maintains a substantial environmental barrier involves providing evidence that purified water is either held in the reservoir for an acceptable period of time or substantially blended year-round.

Between late 2009 and December 2011, activities were undertaken to demonstrate that San Vicente Reservoir provides a substantial environmental buffer year-round. As described in Section C: San Vicente Reservoir Study, a three-dimensional hydrodynamic computer model was used to demonstrate that purified water would either be held in the reservoir for a period of time acceptable to regulatory agencies or substantially diluted year-round. The model was then reviewed with the IAP to ensure that it would provide an accurate representation of how purified water would move through the expanded reservoir.

Once the computer model was set up and validated by the IAP, modeling was performed to simulate the range of potential conditions for introducing purified water into San Vicente Reservoir under a reservoir augmentation project. A Limnology Working Group was convened to review these initial modeling results and recommend additional model scenarios. The Limnology Working Group was comprised of IAP members specifically assigned to vetting the details of all the reservoir work.

Additional modeling was performed to assess the worst-case conditions in San Vicente Reservoir to demonstrate that, even under these worst-case conditions, the reservoir would provide a substantial environmental buffer. Based on the modeling results, preliminary regulatory metrics for the reservoir were proposed. The results of the modeling efforts were summarized in a Reservoir Study ("Retention and Mixing Report"), which was reviewed with the IAP prior to being submitted to CDPH for consideration. Table D-3 provides an overview of the timeline of each action implemented in support of Objective 2.

The regulatory activities noted above focused primarily on CDPH requirements, because the environmental buffer regulatory standard is required by CDPH. In addition to these activities, the City has worked with Regional Board staff throughout the Demonstration Project, including holding project-specific meetings at the Regional Board office and inviting Regional Board staff to attend IAP meetings.

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[6] For specific information regarding the San Vicente Reservoir Study and the San Vicente Reservoir Model, please refer to Section C of this report.

Table D - 3: Timeline of Activities Completed in Support of Objective 2

Activity	Date
Create a three-dimensional hydrodynamic computer model (San Vicente Reservoir Model)	Late 2009
Validate the San Vicente Reservoir Model using 1997 tracer study results	Late 2009
Adjust the San Vicente Reservoir Model to consider components of the expanded San Vicente Reservoir	Early 2010
Conduct IAP Limnology Subcommittee Meeting No. 1 to validate model calibration and applicability	March 2010
Finalize Reservoir Study - Model Development Report (San Vicente Reservoir Model development, validation, scalability)	June 2010
Perform initial modeling	June-October 2010
Conduct Limnology Working Group Meeting No. 1 to review initial model scenario results and recommend additional model scenarios	September 2010
Prepare and Submit draft San Vicente Reservoir Pathogen Removal Issues Paper	November 2010-February 2011
Conduct IAP Subcommittee Meeting No. 2 to assess initial modeling results and pathogen removal capacity of San Vicente Reservoir	March 2011
Assess worse-case San Vicente Reservoir retention scenario using results of second set of San Vicente Reservoir three-dimensional modeling results	April-June 2011
Prepare preliminary reservoir regulatory metrics	August–September 2011
Prepare Reservoir Study –Retention and Mixing Report	August-October 2011
Submit Reservoir Study – Retention and Mixing Report	November 2011
Conduct IAP Subcommittee Meeting No. 3 to review Retention and Mixing Report and preliminary reservoir regulatory metrics	December 2011
Submit Proposal to Augment San Vicente Reservoir with Purified Recycled Water	March 2012
Receive Concept Approval for San Vicente Reservoir Augmentation Project from CDPH	September 2012

Objective 3: *Demonstrate protection of San Vicente Reservoir water quality (specifically focusing on nutrients).*

Demonstrating that San Vicente Reservoir water quality would not be adversely impacted by a reservoir augmentation project at San Vicente Reservoir involved updating the computer model as described under Objective 2 to include a water quality component, or subroutine, so that the effects of purified water on reservoir water quality could be simulated. After meeting with the Regional Board, modeling was performed to demonstrate the negligible effect that adding purified water would have on San Vicente Reservoir water quality. Once the results of the modeling scenarios were presented to the Regional Board, the Regional Board adopted a resolution supporting the City's potential reservoir augmentation project at San Vicente Reservoir.

The modeling effort assessed potential effects of purified water on nitrogen loading into San Vicente Reservoir.

The Testing and Monitoring Plan for the AWP Facility was implemented during the period from August 2011 through July 2012. This involved collecting water quality data including parameters of interest to both CDPH and the Regional Board. These data were assessed to determine whether the quality of purified water produced at the AWP Facility would be suitable to meet Regional Board water quality standards, which – in some cases – are more stringent than CDPH standards. Because nutrient levels in purified water would be slightly higher than potentially required by the Basin Plan, additional model scenarios were performed to simulate the effects of adding purified water on nutrient loading to the reservoir.

Results of these simulations were summarized in a Reservoir Study - Water Quality Report, which was submitted to the IAP and the Regional Board. Nutrient loading was determined to be one area in which additional work would need to be completed to clarify regulatory requirements for a potential full-scale AWP facility. The City met with the Regional Board to discuss the results of the water quality evaluation and outline an approach for achieving regulatory compliance. This approach was summarized in a Proposed Regional Board Compliance Approach, which was submitted to the Regional Board for consideration. Table D-4 provides an overview of the timeline of each action implemented in support of Objective 3.

As described above, the City prepared submittals to both CDPH and the Regional Board to conclude the Demonstration Project regulatory coordination activities and elicit regulatory response. These submittals presented the regulatory framework for a potential reservoir augmentation project at San Vicente Reservoir as understood by the City. More detail on these submittals and the regulatory response is presented in the following sections.

Table D - 4: Timeline of Activities Completed in Support of Objective 3

Activity	Date
Meet with Regional Board to introduce the potential San Vicente Reservoir Augmentation Project	October 2008
Rerun initial San Vicente Reservoir model with water quality component	September 2011
Make presentation to Regional Board on Reservoir Augmentation Project at San Vicente Reservoir and Regional Board adopts resolution supporting the City's potential reservoir augmentation project at San Vicente Reservoir	October 2011
Assess AWP Facility monitoring data regarding Regional Board requirements	December 2011 – February 2012
Perform additional model scenarios to assess addition of purified water and reservoir expansion on nutrient loading	November – December 2011
Prepare Reservoir Study – Water Quality Report	January – February 2012
Submit Reservoir Study – Water Quality Report to Regional Board	March 2012
Conduct IAP Limnology Subcommittee meeting No. 3	March 2012
Meet with Regional Board to discuss San Vicente Reservoir 303(d) Listing and associated nutrient regulatory approach	June 2012
Prepare Proposed Regional Board Compliance Approach	June-August 2012
Submit Proposed Regional Board Compliance Approach to Regional Board	August 2012

CDPH Regulatory Acceptability

CDPH has the authority to approve reservoir augmentation projects on a case-by-case basis. One goal of the Demonstration Project was to receive concept approval from CDPH for a potential reservoir augmentation project at San Vicente Reservoir. The City submitted a proposal to CDPH in March 2012 that presented specific public health protections provided by a reservoir augmentation project at San Vicente Reservoir and summarized technical study results obtained throughout the Demonstration Project and validated by an IAP. The City's proposal, provided in Appendix A, articulated how a reservoir augmentation project at San Vicente Reservoir would provide a multiple barrier approach fundamental to public health protection by incorporating the following elements:

- Enhanced source control to prevent potential contaminants from entering the wastewater stream
- Pathogenic microorganism control through implementation of recycled water treatment and advanced water purification processes
- Control of nutrients including nitrogen compounds through implementation of advanced water purification processes
- Monitoring for regulated contaminants, additional chemicals, and other contaminants
- TOC control, achieved through implementation of an advanced water purification process and a monitoring plan focused on removal of these constituents

- Reliability and redundancy to meet regulatory requirements and prevent purified water from entering San Vicente Reservoir if necessary
- Monitoring and response plan designed to detect any unexpected operational issues at the AWP facility or source water contamination before the purified water reaches the reservoir

Based on the multiple barrier approach outlined in the City's proposal, CDPH issued a Concept Approval Letter to the City in September 2012, in which CDPH approved of the reservoir augmentation at San Vicente Reservoir concept proposed by the City (Appendix B).

Based on the body of technical work completed as part of the Demonstration Project and the successful operation of similar projects elsewhere in California, the program elements listed below were suggested to be implemented as part of the CDPH regulatory framework for the City's potential reservoir augmentation project at San Vicente Reservoir.

Table D - 5: Potential Reservoir Augmentation Project at San Vicente Reservoir Regulatory Program Elements - CDPH

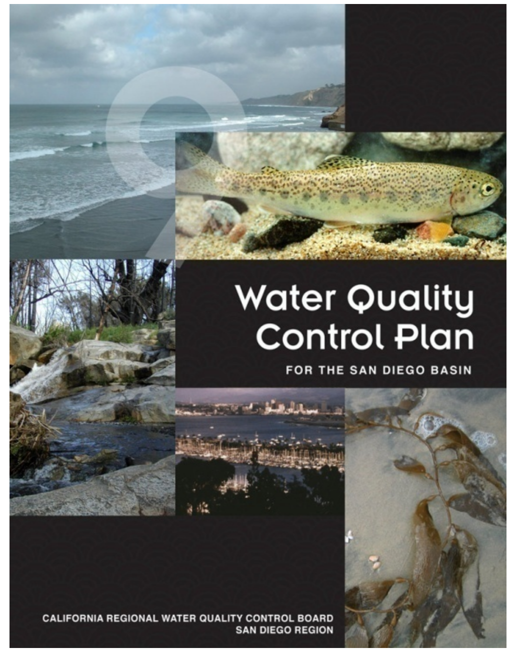
Control Point: Prior to Entering the Wastewater Collection System
• Establish enhanced source control program for the North City service area to prevent target contaminants from entering the wastewater stream.
Control Point: North City Water Reclamation Plant (source of recycled water for advanced water purification)
• Implement flow equalization to deliver a constant flow of recycled water from North City to the AWP Facility, simplifying process operation.
• Achieve full nitrification in the secondary aeration process to assist in reducing the amount of nitrogen in recycled water produced at North City.
• Operate with no return flows from biosolids processes (biosolids from North City are processed off-site) to produce the highest quality recycled water.
• Use tertiary-filtered water from North City as the source water for the AWP Facility.
Control Point: Advanced Water Purification Facility (AWP Facility)
• Treat the entire amount of water sent to the AWP Facility with membrane filtration and reverse osmosis meeting applicable CDPH specifications and performance measures to ensure the best quality of purified water possible.
• Treat the entire amount of water sent to the AWP Facility with advanced oxidation meeting applicable CDPH specifications and performance measures to ensure the best quality of purified water possible.
• Implement a Critical Control Point Monitoring Plan that includes surrogate indicators recommended by the industry at time of implementation. Surrogate indicators allow the City to quickly and easily detect any unexpected treatment process interruptions so that they may be addressed right away.
• Maintain a certified operator on-site at all times (24 hours/day) to ensure proper facility operation and oversight.

Control Point: San Vicente Reservoir
• Maintain an adequate combination of retention time and blending in the reservoir at all times to meet regulatory requirements and provide a barrier to potential pathogens.
• Locate the purified water inlet (where purified water enters the reservoir) and the reservoir outlet (where water leaves San Vicente Reservoir) such that purified water moves along a lengthy path from the inlet to the outlet, increasing the time that the water is held in the reservoir.
• Achieve a minimum blend of purified water with ambient reservoir water, at the outlet, of 100:1 at all times to achieve regulatory requirements to provide a substantial environmental buffer.
• Demonstrate criteria to ensure that purified water moves along a lengthy path from the inlet to the outlet and the criteria for blending of purified water at the outlet using a calibrated and validated hydrodynamic model. This allows the City to demonstrate that the requirements for a substantial environmental buffer would be achieved.
• Release purified water above the lower layer of water within San Vicente Reservoir, and withdraw water from the lower layer when layers are present (refer to Section C of this report for more information). This will allow the City to ensure that purified water remains in the reservoir for a longer period of time prior to being withdrawn.
• Treat water withdrawn from the reservoir at a drinking water treatment plant before distribution to the City's customers to provide an additional level of public health protection.
• Maintain the ability to take the reservoir offline as a source of supply to the drinking water system within 24 hours at all times to allow quick response time in the unlikely event that an unexpected process interruption requires the reservoir to be taken offline.

Regional Board Acceptability

Potential challenges associated with permitting a water purification project within the Regional Board regulatory framework were thoroughly discussed in meetings and correspondence conducted between the City and Regional Board throughout the Demonstration Project. Despite the exceptional quality of the purified water that would be released into San Vicente Reservoir, addressing the full array of applicable state and federal water quality standards, plans, and policies could require substantial time and effort. For example, although the nitrogen level in purified water would be comparable to that in imported water inflows to San Vicente Reservoir, purified water inflows would require a Regional Board permit and compliance with Basin Plan water quality objectives, whereas imported water inflows do not. Nitrogen loading associated with releasing purified water into the reservoir is an example of an issue that would require further Regional Board consideration before a reservoir augmentation project at San Vicente Reservoir could be implemented.

Based on coordination with the Regional Board, the City prepared a submittal to the Regional Board entitled "Proposed Regional Water Quality Control Board Compliance Approach" (Appendix D). This document, submitted to the Regional Board in August 2012, summarized the reservoir augmentation at San Vicente Reservoir concept and identified key permitting issues and Regional Board regulatory decisions and actions that would be required in order for the Regional Board to approve a project at San Vicente Reservoir. This document indicates that based upon the Regional Board's interpretation of nitrogen limits within the Basin Plan, purified water flows to San Vicente Reservoir may be required to achieve a total nitrogen concentration limit of 0.25 mg/L to 1.0 mg/L. Water quality testing undertaken at the AWP facility indicates that the average concentration of total nitrogen in purified water is 0.8 mg/L, meaning that purified water could potentially exceed nitrogen concentration requirements established within the Basin Plan. Although purified water nitrogen concentrations could potentially exceed regulatory limits, total nitrogen concentrations in purified water are comparable to or lower than current water inflows to San Vicente Reservoir. Nitrogen concentrations in imported water inflows to San Vicente Reservoir range from 0.17 mg/L to 0.68 mg/L, and nitrogen concentrations in surface water runoff to San Vicente Reservoir range from 0.18 mg/L to 4.2 mg/L.



Although nitrogen levels in the purified water could potentially exceed Basin Plan requirements, total nitrogen levels in purified water are comparable to or lower than current nitrogen concentrations in San Vicente Reservoir.

The submittal noted the following:

- AWP Facility monitoring data indicate that the purified water supply would be equal or superior in quality to existing San Vicente Reservoir inflows for virtually all constituents. Nitrogen could be the only exception to this, as purified water nitrogen concentrations would be slightly higher than existing imported water inflows to San Vicente Reservoir, but superior in quality to the local runoff captured within the reservoir.
- Comprehensive reservoir modeling conducted as part of the Demonstration Project indicate that nitrogen concentrations under a reservoir augmentation project at the expanded San Vicente Reservoir are projected to be less than historic nitrogen concentrations in the reservoir.

On October 12, 2011, the Regional Board adopted Resolution No. R9-2011-0069, which documented the Regional Board's support for a reservoir augmentation project at San Vicente Reservoir. That resolution, included as Appendix C, also sets forth the Regional Board's proposed means of regulating the full-scale project.

The Regional Board noted that two key procedural questions will determine the pathway the City would need to take to proceed with applying for and receiving an NPDES permit for a full-scale project. These questions include:

- Prior to the Regional Board's consideration of an NPDES permit for reservoir augmentation at San Vicente Reservoir, would the Regional Board, State Board, and EPA need to take actions to modify the Clean Water Act Section 303(d) impaired water list for San Vicente Reservoir?
- Prior to the Regional Board's consideration of an NPDES permit for reservoir augmentation at San Vicente Reservoir, would the Regional Board, State Board, and EPA need to modify any requirements within the Regional Board's Basin Plan?

Excerpt from Regional Board Resolution No. R9-2011-0069

NOW THEREFORE, BE IT RESOLVED THAT, the San Diego Regional Water Quality Control Board:

- Supports the efforts to develop the Reservoir Augmentation Project at the San Vicente Reservoir as a means to reduce reliance on imported water, increase the use of recycled water, and to implement goals in California Water Code section 13510 and the 2008-2012 Strategic Plan Update for the Water Boards.
- In accordance with implementation provisions of the Basin Plan, the San Diego Water Board will regulate San Diego Region recycled water reservoir augmentation projects through the issuance of project-specific NPDES Permits.
- Reservoir augmentation NPDES permits issued by the San Diego Water Board will incorporate requirements established and the provisions recommended by California Department of Public Health.

The City’s submittal provided a recommended pathway to address these procedural questions expeditiously, and noted that if the answer to both questions is “no”, the pathway for approval would be straightforward. The City believes that this direct approval pathway (no Basin Plan modification or 303(d) list revisions) would be both feasible and appropriate. If the answer to either question is “yes”, the project would remain feasible, but up to two years could be added to the project’s implementation timeline.

.In response to the City’s submittal, the Regional Board issued a letter concurring with the recommended regulatory pathway, acknowledging that neither the 303(d) impaired water listing nor the Basin Plan would need to be modified in order to permit a full-scale reservoir augmentation project at San Vicente Reservoir. This February 2013 Regional Board Letter of Concurrence (Appendix E) also reaffirmed that agency’s strong support for the City’s efforts in moving forward with a full-scale project, and noted that EPA concurs with this support and regulatory pathway.

Section E: Public Outreach and Education

Public Outreach and Education Findings

- According to tour participant feedback, comprehension of the water purification process increased following the completion of an AWP Facility tour.
- A series of public opinion polls shows a steady increase from 2004 (26 percent) to 2011 (68 percent) to 2012 (73 percent) of City residents who favor using advanced treated recycled water as an addition to the City's drinking water supply.

The public outreach and education program for the Demonstration Project continued from outreach efforts that started with the Water Reuse Study, the first phase of the City's Water Reuse Program. The outreach program for the Demonstration Project built on the foundation that had been laid during the Water Reuse Study.

The San Diego Assembly on Water Reuse

In 2005, the Water Reuse Study included a public outreach program that provided valuable input on how to best increase recycled water use as part of the City's plan for a reliable, long-term water supply. A key element of that public outreach program was the City of San Diego Assembly on Water Reuse, which brought together 59 individuals who resided in San Diego and were recommended by the Mayor and City Council to serve on this group. A non-technical group, these individuals represented a broad range of perspectives about San Diego. They reached agreement on a number of specific recommendations related to water reuse options for the City, including that "…technology and scientific studies support the safe implementation of non-potable and indirect potable use projects" (City of San Diego 2006). In addition to the American Assembly-style workshops, the City conducted several types of public opinion research including individual interviews, focus groups, and an online and telephone survey. To inform the public about the advanced water purification process, they also made presentations to groups, worked with the media, produced electronic newsletters, and established a website.

Because of a history of misinformation about water purification, City Council instructed that public outreach be included as a component of the Demonstration Project. Based on the City Council's directive, an outreach goal was adopted "…to inform and educate San Diego's local leaders, stakeholders and residents about the Demonstration Project."

In addition to the outreach goal, the following objectives were identified at the onset of the public outreach and education program:

- Foster a clear understanding of the Demonstration Project and its goals among all stakeholder groups
- Provide a description of the Demonstration Project and its results to the public
- Provide information on the opportunities and challenges of using reservoir augmentation as a component of diversifying the City's water supply

To accomplish the goal and objectives, a strategic outreach plan was developed to guide the comprehensive public outreach program envisioned for the Demonstration Project. A dedicated public outreach team was established to implement the program and to work closely at every step in the process with the technical team, which included the AWP Facility design and operating teams. The outreach team included the following staff:

- Project director
- Senior public information officer
- Two outreach practitioners dedicated full-time to the project
- Four multicultural consultants
- Media consultant

Throughout the duration of the Demonstration Project, the Public Utilities Department has sought to ensure that information about the Demonstration Project is presented in a clear, understandable, and accessible way to residents in all areas of the City. Information about the Demonstration Project has also been provided through a variety of formats including direct contact with individuals, written and electronic informational materials, traditional and social media, group presentations, community events, and tours of the AWP Facility. Starting in mid-2010, the following activities were completed during the first year of the project:

- Developed the outreach plan
- Conducted research, including one-on-one stakeholder interviews
- Produced informational materials
- Assembled a speakers bureau composed of project team members and Public Utilities Department staff
- Created a presentation about the project for community groups that was used for Speakers Bureau engagements

- Requested recommendations from City Council members to contact for presentation opportunities
- Conducted project presentations to community, planning groups, service clubs and business organizations, internal staff, and the City's IROC and NR&C
- Participated in industry conferences
- Developed an email list database of individuals interested in the project
- Distributed eUpdates and electronic newsletters to interested parties
- Participated in community events
- Provided project information to a broad group of media representatives and outlets
- Compiled quarterly metrics reports and analyzed them to guide future outreach activities

Beginning in mid-2011, the second year saw a continuation of the outreach activities initiated during the first year such as presenting to community, planning groups, service clubs and business organizations, and participating in community events, but added the following activities:

- Launched the Urban Water Cycle Tour program, which culminated in the AWP Facility tours
- Invited elected officials and project stakeholders to visit the AWP Facility when it began operation in mid-2011
- Developed additional informational materials, such as a virtual tour video, project white papers and a tour brochure
- Established a social media presence online using Facebook, Twitter, and YouTube
- Implemented continuous improvements in the AWP Facility tours based on feedback from tour guests
- Continuously enhanced Speaker Bureau presentations based on attendee feedback

All of the numerical data in this report reflects the activity from the commencement of the outreach program in spring 2010 through December 31, 2012. The outreach program is a continuing effort to educate San Diego residents about the potential for reservoir augmentation in the City. Although there is a "cutoff date" for reporting the statistics, the outreach efforts are ongoing. The Demonstration Project outreach program is described in more detail in the following sections. Supporting materials for Section E, Public Outreach and Education, are available on the Public Outreach and Education CD (Appendix H).

Planning, Research and Monitoring

The City's Public Utilities Department was committed to a comprehensive, transparent, and inclusive public outreach program that would inform residents of San Diego about the Demonstration Project. The first step to achieving this goal was to develop a plan to guide public outreach activities and ensure all activities were implemented throughout the City. As with the Water

Reuse Study, the City incorporated research findings to identify outreach activities to ensure all potential audiences had the opportunity to learn more about the Demonstration Project. Additionally, the City tracked its progress in reaching residents in all City Council Districts (using the eight-district map that reflected district boundaries from the beginning of the Demonstration Project until late 2012) through quarterly metrics reports.

Outreach Plan

The outreach plan, completed in May 2010, identified the variety of outreach activities and informational materials necessary to ensure prospective audiences knew about and were engaged in the Demonstration Project and its core element, the AWP Facility. The key points to be presented to City residents included:

- San Diego needs to develop local, reliable, and sustainable sources of water to lessen our dependence on imported water due to multiple factors affecting California's water supply.
- The Water Purification Demonstration Project is examining the use of water purification technology on recycled water to determine the feasibility of full-scale reservoir augmentation in the future.
- The water produced by the purification process goes through multiple steps of advanced treatment and will be tested to meet all water quality, safety, and regulatory requirements.
- No purified water will be added to the San Vicente Reservoir or San Diego's drinking water system during the Demonstration Project.

It was concluded that the most effective and efficient way to achieve the goal of informing San Diego residents about the water purification process was through focusing communication efforts on community leaders, stakeholder groups, and other local organizations. Audiences for the outreach program included local business; environmental, civic, and community leaders from all areas in the City of San Diego, including its vibrant multicultural communities; members of community planning groups and neighborhood councils; elected officials at all levels of government; media representatives; special interest groups such as seniors, the health community, science students, and religious leaders; Public Utilities Department staff; and water agencies throughout the county.

The core elements of the outreach activities were the speakers bureau, community events, and AWP Facility tours. The speakers bureau provided an opportunity for community groups and organizations of all types to learn more about the Demonstration Project through a presentation and opportunity to ask questions. Hosting informational booths at community events allowed for one-on-one discussions with a breadth of San Diegans. The AWP Facility tours provided an opportunity for individuals and groups to visit the facility to see firsthand the purification process and the quality of the water produced.

Research

The outreach plan recommended following previous research protocols to learn more about what residents and stakeholders knew about water reuse in general and water purification specifically. Information was obtained from three main sources: one-on-one stakeholder interviews, a telephone survey of City residents conducted in conjunction with the Water Authority's public opinion polls, and a San Diego State University student research study. Results from the research efforts guided the Demonstration Project's public outreach and information activities.

Stakeholder Interviews

The City recognized the importance of ensuring stakeholders from all communities in the City who had a vested interest in the Demonstration Project knew about it: what it was, what it was not ("Toilet to Tap"), and how they could learn about the Demonstration Project and provide input. This led to 105 one-on-one interviews with stakeholders throughout the City from mid-2010 to mid-2011. Stakeholders were identified through City Councilmember and Water Reliability Coalition member recommendations (see the *Stakeholder and Partner Communication* section) as well as by reviewing lists of stakeholders interviewed during the Water Reuse Study.

In addition to gauging their level of awareness about the Demonstration Project and the advanced water purification process, interviewers sought to learn the best way to provide information about the Demonstration Project to the community or group represented by each stakeholder and to determine what kind of information the stakeholder would need to more clearly understand the purification process. Water quality and public health and safety were the top concerns stakeholders mentioned about the concept of reservoir augmentation. This underscored the importance of providing information about the water purification process and the multiple barriers provided by the membrane filtration, reverse osmosis, and UV disinfection/advanced oxidation steps. It also emphasized the importance of the planned AWP Facility tour program and the need to provide information about how water quality will be monitored.

Public Opinion Polls

The Water Authority regularly conducts public opinion polls to garner information about attitudes toward water issues throughout the county. For the 2012 survey, as with the 2011 and 2004 surveys, the City requested that a statistically-significant sample of approximately 400 City residents be polled to provide a good base of knowledge about water attitudes in the City. According to the findings, nearly three-fourths of City residents favored using recycled water to help diversify the City's water supply (see Figure E-1) and 71 percent believed that recycled water used for irrigation could be further treated to make the water pure and of the highest quality for drinking (see Figure E-2). When the concept of the Demonstration Project was explained to them as part of the poll, over three-fourths of the respondents expressed strong support for it.

Figure E - 1: 2012 Public Opinion Poll – Opinion about Using Advanced Treated Recycled Water as an Addition to Drinking Water Supply

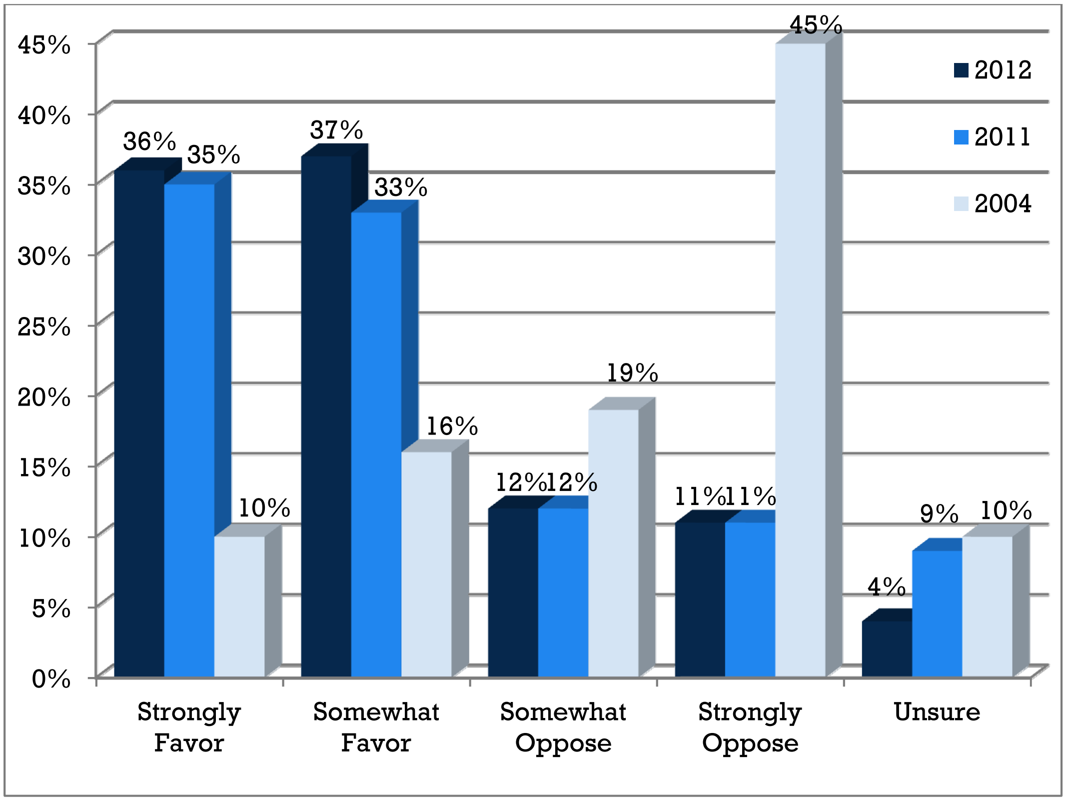
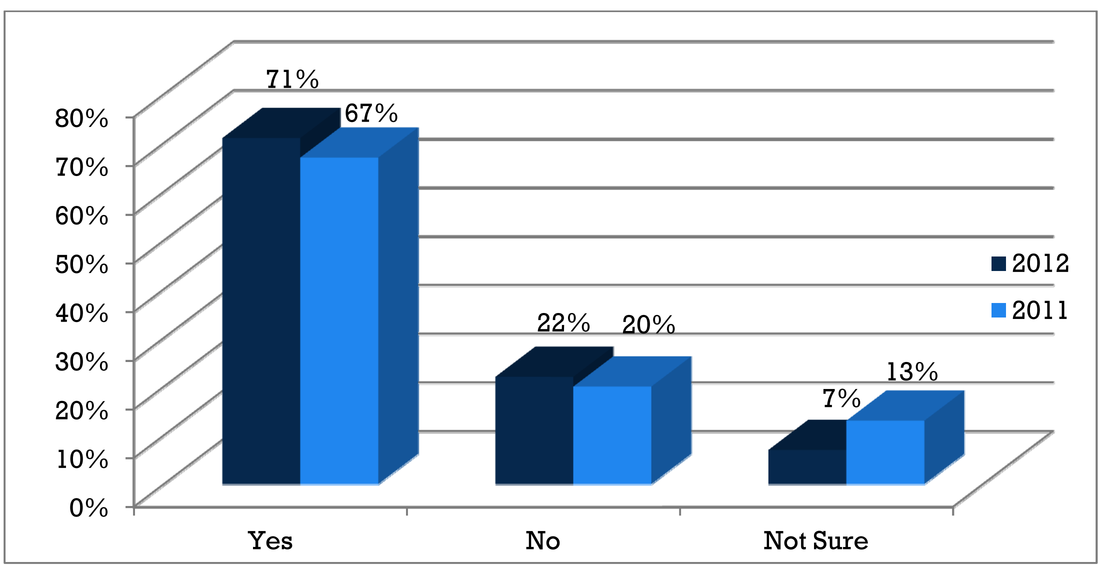


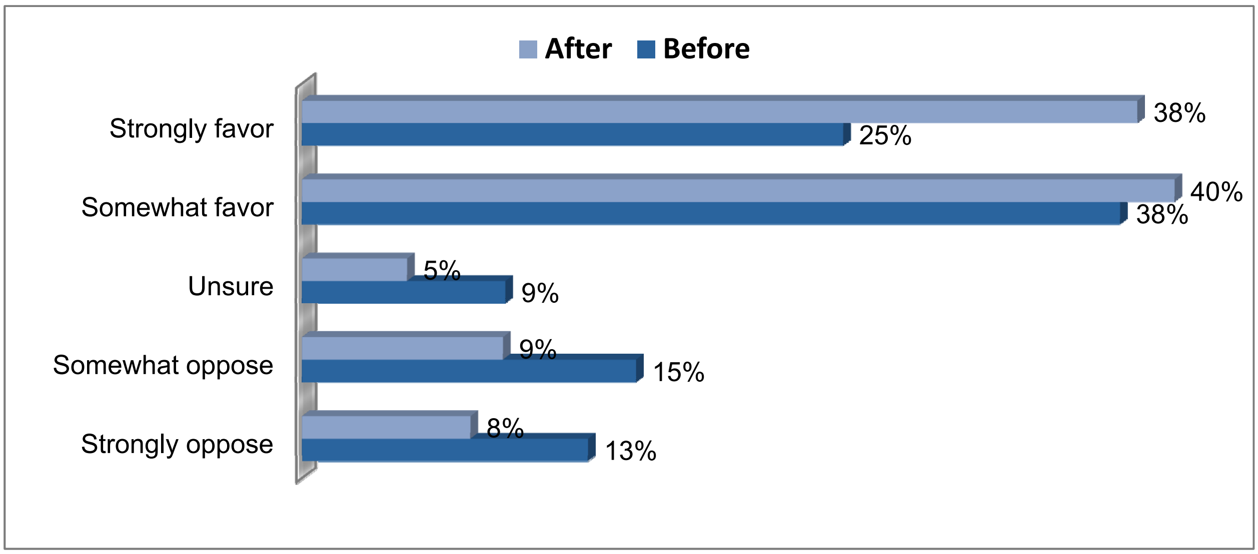
Figure E - 2: 2012 Public Opinion Poll – Is It Possible to Further Treat Recycled Water Used for Irrigation to Make It Pure and Safe for Drinking?



San Diego State University Research Study

A research study regarding the Demonstration Project was conducted in the fall of 2010 by a research methods class at San Diego State University (SDSU). The students conducted 63 in-depth interviews with City of San Diego residents. The information culled from these interviews was used to create a random digit dial telephone survey questionnaire. Students used the questionnaire to interview a statistically-significant sample of 626 San Diego residents by telephone in November 2010. After being read a description of the Demonstration Project, 63 percent of respondents said they supported it. The next step in the process was to provide more information about advanced water treatment to the respondents. This step validated the importance of informing people about the Demonstration Project, since 78 percent were supportive of the Demonstration Project once they learned more about it (see Figure E-3).

Figure E - 3: Impact of Additional Information on Support



Application of Findings

The research findings from the stakeholder interviews, public opinion polls, and the SDSU study helped determine which public outreach activities should be emphasized. For example, since the SDSU research found that people tended to trust scientists most for their water information, engineers and plant operators led AWP Facility tours and emphasized that the entire project is overseen by a team of experts from the IAP. Stakeholders also expressed concerns about water quality in the one-on-one interviews, so an extensive discussion of water quality is included in all project presentations. The purified water quality is also displayed visually at a sink that dispenses water produced at the AWP Facility at the end of the tour.

Outreach Metrics Report

The City's IROC serves as an official advisory body to the Mayor and City Council on policy issues relating to the oversight of the Public Utilities Department's operations. IROC's Outreach and Communication Subcommittee (formerly known as the Public Outreach, Education and Customer Service Subcommittee) noted the importance of measuring and evaluating the Demonstration

Project's outreach activities. The metrics reports that were developed in response to this request summarized completed outreach activities and provided direction for scheduling future activities. Outreach data were compiled into a comprehensive quarterly report that identified outreach activities completed to specific audiences during that reporting period. Included in the reports were the number of tour attendees, community presentations, eUpdates, new contacts, and more. The report also included additional details about each of these activities. A review of the metrics report guided the focus for future outreach activities. This ensured that every community in San Diego had the opportunity to learn about the project, whether through an article in a community newspaper, a water bill insert, attending a presentation, or touring the facility.

Education and Outreach Materials and Tools

Informational materials were developed as tools to explain and disseminate information about the Demonstration Project and the science behind water purification. These materials were tailored to the interests of multiple audiences and were made available in a variety of formats including both print and electronic versions. The materials were created to appeal to multicultural and age-specific audiences, and were translated into Spanish and Vietnamese. To ensure all aspects of the project were clearly understood, project informational materials were posted on the project's website, www.PureWaterSD.org, and distributed or available at presentations, tours, community events, and all other outreach activities.

Fact Sheet

An easy-to-understand fact sheet was developed early in the Demonstration Project to provide a description of the project, highlighting the need for a local, reliable source of water in San Diego and the components of the Demonstration Project. The fact sheet includes a schematic of the advanced water purification process, as well as the water treatment and distribution processes, to clarify any misconceptions about the Demonstration Project. It was written for lay audiences and translated into Spanish and Vietnamese for multicultural outreach opportunities. The fact sheet was distributed at stakeholder interviews, presentations, and community events, and available at AWP Facility tours, all City library branches, City Council offices, and the Mayor's office. It is also on the project website. The fact sheet was also condensed into a "quick facts" version with bullet points for use as reference.

Fact Sheet

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

The City of San Diego has limited local water sources and relies on importing approximately 85 to 90 percent of its water supply. In the past, importing water from the Colorado River and Northern California has been a low-cost, reliable option, but environmental stresses and court-ordered pumping restrictions have continued to reduce the amount of water that can be delivered to San Diego. These circumstances and the threat of further limitations on our water supplies have intensified the need for new sources of water. As part of the City's effort to provide a local and sustainable water supply, the Water Purification Demonstration Project is examining the use of water purification technology to provide safe and reliable water for San Diego's future.

The Demonstration Project is the second phase of a process evaluating ways for the City to increase its use of recycled water. The first phase was the City's 2005 Water Reuse Study that identified reservoir augmentation as the preferred option for developing recycled water sources. The Demonstration Project will determine if reservoir augmentation is a feasible option for San Diego.

Reservoir augmentation is a multi-step process that includes:

- Using water purification technology on recycled water
- Sending the purified water to a reservoir to blend with existing water supplies
- Treating the blended water again to be distributed as drinking water

The Demonstration Project is underway and will conclude in early 2013. During this time, the Advanced Water Purification Facility will operate for approximately one year and will produce 1 million gallons of purified water per day. A study of the San Vicente Reservoir is being conducted to test the key functions of reservoir augmentation and to determine the viability of a full-scale project. No purified water will be sent to the reservoir during the demonstration phase.

An independent advisory panel of experts is providing oversight on project research to determine (1) if the purification process satisfies all water quality, safety and regulatory requirements of the California Department of Public Health, and (2) the behavior of the reservoir and what will happen if the purified water is added. A summary report detailing the results of the Demonstration Project will be provided to the Mayor and City Council. If deemed technically feasible, and following Mayoral and City Council authorization, a full-scale reservoir augmentation project would be implemented.

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

Potential benefits of implementing Reservoir Augmentation in San Diego:

- Provide a local and sustainable supply of purified drinking water for San Diego
- Improve the quality of water in the San Vicente Reservoir
- Decrease dependence on imported water
- Increase utilization of recycled water
- Provide a supply of water that uses less energy than imported water
- Have a positive impact on the environment by producing less discharge into the ocean and working toward lower carbon emissions

In an effort to keep San Diego citizens informed , the public outreach program is offering free tours of the Advanced Water Purification Facility and project presentations are being made to groups upon request. For more information, please call (619)533-7572 or email purewatersd@sandiego.gov. To register for a tour, please visit www.purewatersd.org.

PUBLIC UTILITIES

City of San Diego Public Utilities Department • Long-Range Planning & Water Resources Division
600 B Street, Suite 600, San Diego, CA 92101 • (619)533-7572 www.purewatersd.org

An easy-to-understand fact sheet was developed for distribution and for inclusion on the project website.

Frequently Asked Questions (FAQ)

The most frequently asked questions related to the Demonstration Project were answered in an FAQ to clarify misconceptions and further explain the components of the project. The FAQ was distributed at stakeholder interviews, presentations, and community events, and available at AWP Facility tours, all City library branches, City Council offices, Mayor's office, and on the project website. The questions were updated as needed according to public feedback.

Information Card

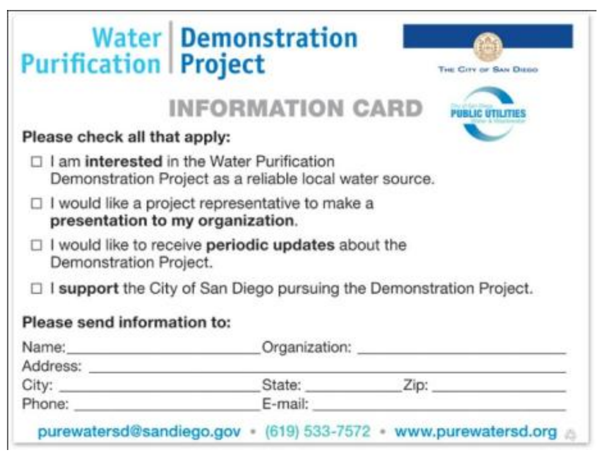
To ensure project information was presented clearly and understandably to all audiences, it was important that information be conveyed about project components in a consistent manner. This reduced confusion and fostered clarity about the Demonstration Project. A business card-sized informational piece was created as a portable, quick-reference item to carry as a reminder of key information points, or project messages, to provide to any audience. The card also included project contact information and the website address for easy reference.

Fact Card

The project fact card was a version of the information card produced for distribution at community events and AWP Facility tours to ensure consistency of project information and to provide contact information and the project website address.

Interest and Information Card

The interest and information card was used at all outreach activities and was designed to allow interested parties, community leaders, tour guests, and presentation participants to provide their contact information, level of interest, and any requests for additional information. A simplified version was created for use at events to gather names and email addresses. The extensive list was compiled and added to an email list to receive project updates, electronic copies of the project newsletter, eUpdates, and information about project involvement opportunities. The card also allowed members of the community to request group presentations or suggest additional groups to contact for a presentation. A total of 1,056 interest cards were collected from stakeholder interviews, community events, presentations, and facility tours. The interest cards included postage and a mailing address if interested parties preferred to complete and mail in the card at a later date.



Water Purification | Demonstration Project

THE CITY OF SAN DIEGO

PUBLIC UTILITIES

INFORMATION CARD

Please check all that apply:

- ☐ I am **interested** in the Water Purification Demonstration Project as a reliable local water source.
- ☐ I would like a project representative to make a **presentation to my organization.**
- ☐ I would like to receive **periodic updates** about the Demonstration Project.
- ☐ I **support** the City of San Diego pursuing the Demonstration Project.

Please send information to:

Name:____ Organization: ____
Address: ____
City: ____ State: ____ Zip: ____
Phone: ____ E-mail: ____

purewatersd@sandiego.gov • (619) 533-7572 • www.purewatersd.org

An interest and information card allowed people to provide contact information, indicate level of interest, and request additional information.

Website

The official project website (with the domain name PureWaterSD.org) was designed and hosted on the City website. The site included all project materials, updates, related media, and up-to-date information about the project. For ease of use, a tour sign-up link was located on the home page. The project website was publicized on all informational materials and mementos to encourage an online following.

Content on PureWaterSD.org includes the following:

- AWP Facility tour registration
- Project history
- Email subscription registration system
- eUpdates
- IAP member list and activities
- Informational materials
- White papers
- Videos
- Project PowerPoint presentations
- WateReuse Association PowerPoint "Downstream"
- News coverage and related news clips
- Newsletters
- Completed speakers bureau presentation list
- Contact information
    - Links to project social media pages
    - Presentation request information
- Links to relevant resources or information about water reuse and water purification

Photography

Outreach efforts were documented with photographs, which were used in informational materials such as presentations, advertisements, newsletters and media outreach, and were placed on the project website and social media pages. Photographs were taken at most outreach activities, including community events, presentations, facility tours, and conferences.


Pure News
Water Reuse Program
Water Purification Demonstration Project
Water Purification Demonstration Project
Summer 2012
The City of San Diego • Public Utilities Department

Pure News: Issue 6

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project.

Moving Right Along

It's hard to believe it has been one year since the Advanced Water Purification (AWP) Facility began operation in June 2011. This demonstration facility purifies one million gallons of recycled water a day for testing and analysis before being diverted back to the City's recycled water system. The purification process uses microfiltration and ultrafiltration, reverse osmosis, and ultraviolet disinfection with advanced oxidation. The AWP Facility will continue to operate and offer tours through next year.

Although the AWP Facility is the centerpiece of the Demonstration Project, other behind-the-scenes work has been taking place as part of the project. For more than two years, staff have been conducting a study of the San Vicente Reservoir, working with California Department of Public Health and the San Diego Regional Water Quality Control Board to define regulatory requirements, and determining the cost of a full-scale project.

A final report compiling the results of the project's components is scheduled for completion at the year's end. The report will be available to the public following its release to the Mayor and City Council.

Pulling Out All the Stops for Purified Water

When it comes to water purification, many people refer to it as "toilet-to-tap." Although that is a catchy

Expanding Recycled Water Use

In 2009, the City of San Diego launched a Recycled Water

Pure News, a newsletter about the project, was published three times a year

Electronic Updates ("eUpdates")

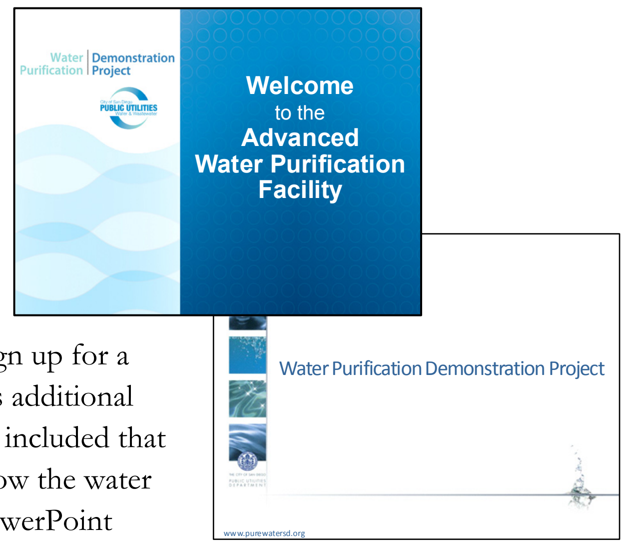
A series of electronic project updates (eUpdates) was designed and distributed by email as a way to provide project information updates as necessary to interested parties. Content included new information, recent media coverage, community involvement events, tour information, and photographs. These emails included brief updates about timely issues that may not be covered in the project newsletters.

Newsletter

A newsletter titled *Pure News* was published three times per year to provide updates on the project, highlight community outreach activities, call attention to project-related media stories, encourage readers to visit the AWP Facility, and share photographs. It was distributed electronically to a list of up to 3,890 interested parties compiled through project outreach activities (refer to the *Promoting the Demonstration Project* section for more information). Copies of the newsletter were printed for distribution at presentations and community events, and each issue has been made available on the project website.

PowerPoint Presentations

PowerPoint presentations were created for the speakers bureau and facility tour program. The presentations provided an overview of San Diego's water supply challenges and how the City is working to meet those challenges. The presentations provided the history of the project; explained its components; and encouraged public participation in the outreach program by letting audience members know how to sign up for a tour, request additional presentations, and easily access additional information about the project. A short video was also included that describes the multiple barrier treatment process and how the water purification equipment works. The objective of the PowerPoint presentations was to explain the science behind water purification. Presentation content was reviewed regularly to consider public feedback and new information. A long and short version of the project presentation was available to accommodate varying presentation timeframes. More information about the presentations and how they were used can be found in the *Business and Community Outreach and Speakers Bureau* sections.



The speakers bureau and facility tour program incorporated PowerPoint presentations to explain the science behind water purification.

Posters, Banners, and Mementos

Posters were created for display at the AWP Facility, presentations, and community events. The posters included images such as a schematic of the water distribution process, the multiple barrier treatment steps, and San Diego's imported water supply system. They provided a visual explanation of project components and referred interested parties to the project website and social media sites to continually build an online following. Banners featuring the project logo and website were also designed and produced to be used at community event exhibits.

Mementos were designed and distributed at community events and facility tours to serve an educational purpose.

Various mementos were distributed at community events and facility tours to serve an educational purpose. Useful and practical mementos featuring the project logo and website address were chosen based on the corresponding outreach activity. They appeal to a wide variety of audiences and remind them of how to get additional project information. Some mementos displayed the multiple barrier process in order to reinforce the science behind the technology.

White Papers

For those seeking in-depth information about the project, two white papers were created and posted online:

- The *City of San Diego Water Purification Demonstration Project, Advanced Water Purification*, which describes the multiple barrier processes and water quality testing in greater detail and addresses strategies that have been developed to manage potential risks from CECs
- *Potable Reuse Projects in the United States*, which includes details about other projects that use water purification processes and a timeline of their construction

Water Bill Inserts

A bilingual insert that announced the opening of the AWP Facility and tour opportunities was included in water bills and circulated for three months in 2011 and 2012. Water bills are delivered to approximately 275,000 ratepayers bimonthly. Based on findings gleaned from tour registration data, many AWP Facility tour participants found out about the tour program from the inserts.

A bilingual insert announcing the opening of the AWP Facility and tour opportunities was included in water bills.

Tour Guide Binder

As part of the tour program, a tour guide binder was developed to contain information relevant for those guiding tours of the AWP Facility. The binder included an in-depth tour script, key project information, and answers to frequently asked questions heard on previous tours. More information about the AWP Facility tours is included in the portion of this section titled *Business and Community Outreach*.

AWP Facility Brochure

To promote the project's tour program, a brochure was designed that highlights the AWP Facility. The brochure includes a brief project overview, a schematic and photos of the facility, an explanation of each of the three treatment barriers involved in the purification process, and information on how to register for a tour and follow the project online. The brochure, geared toward a general audience by using layperson's language, was intended for distribution as a take away at AWP Facility tours, community events, and presentations. It is also available on the project website.

Media Kit

A media kit was developed for distribution to local and national media representatives. The kit included the project fact sheet and FAQ, key information points, local and national news articles, the AWP Facility brochure, information about the Orange County GWRS, the white paper about related projects, a photo CD, and other relevant materials. The kit can be easily updated as needed. Project materials were provided for inclusion in media kits prepared for news conferences on related Public Utilities Department topics.

Tabletop Display Units

Two identical tabletop display units were created, one for display at the AWP Facility and the other to be used at community events. The collapsible and transportable units had Velcro panels, which allowed the display unit to be easily updated and changed as needed. The display units featured images and information about San Diego's water supply challenges, the components of the Demonstration Project, the purification process, and highlights of project media coverage locally and nationally.

The project tabletop display unit

Children's Activity Page

To incorporate children in the educational process, a worksheet was developed that introduced the concepts of water purification while engaging them in fun activities such as a maze, word search, and crossword puzzle. A solutions page was also developed for teachers and parents to check the children's work and to provide them with the correct answers. The activity page was distributed to children at tours and events.

AWP Facility Virtual Tour Video

A video was created that provides a virtual tour of the AWP Facility and the water purification process to ensure the AWP Facility tours were accessible to all San Diegans, including those who may not be able to physically tour the facility. The video includes footage of the equipment and explanations of the multiple barrier treatment process. The virtual tour is featured on the project website, YouTube page, and on DVD. DVDs were distributed to City public libraries for use in educational programs as well as to City Council offices, other elected officials, and other interested parties. The video has been viewed more than 880 times on YouTube.

Community Outreach and Tours

In order to reach a large and diverse segment of San Diego community members, various methods were used to connect with San Diegans. Through community outreach activities, these connections were used to share project information with a wide variety of audiences, such as grade school students, individuals from every community in San Diego, water industry professionals, and elected officials. The Demonstration Project established a presence throughout San Diego by hosting informational booths at community events, , welcoming guests to tour its AWP Facility, regular updates to decision makers and additional community outreach efforts.

Demonstration Project booth at the Sally Ride Science Festival

City Boards and Commissions

San Diego City Council requested that decision makers be kept informed about the status of the Demonstration Project. Therefore, the project director regularly presented to NR&C and IROC. Updates about the Demonstration Project components were provided at 19 NR&C meetings and five IROC meetings, including presentations to the IROC Environmental and Technical Subcommittee and the IROC Outreach and Communications Subcommittee.

Community Events

Hosting informational booths at community events was an important way to communicate directly with audiences from all over the City, including those who might not have been inclined to seek out water information. The Demonstration Project was featured at 42 community events in all San Diego council districts. These events varied from science expositions to festivals. At the informational booth, educational materials were distributed, project details were discussed, and contact information from booth visitors was collected to continually build a database of interested parties for future outreach. Members of the multicultural team staffed ethnic events to provide project information in a culturally appropriate manner to all San Diego residents.

Urban Water Cycle Tour Program

Tour pathway sign

One of the Demonstration Project's most valuable outreach tools for explaining the science behind water purification technology was the Urban Water Cycle tour program. In the natural water cycle, water evaporates, forming clouds and then returning to earth as precipitation. The "urban water cycle" recognizes that used water from homes and businesses is treated at wastewater treatment plants and discharged to a water body from which it will evaporate. However, the natural process of evaporation and precipitation can be accelerated, as is done by the AWP Facility. Tours were given of water treatment, wastewater treatment, and water purification facilities to provide stakeholders with an up-close experience of the treatment process along with a better understanding of the "urban water cycle."

Prior to the opening of the AWP Facility, stakeholders visited the Alvarado Water Treatment Plant and Point Loma Wastewater Treatment Plant to learn more about what treatment processes are used at each facility and the need each facility fills. Since its opening in June 2011, the AWP Facility remained the focus of the Urban Water Cycle tour program and was one of the primary outreach activities that provided project information. The tour provided San Diegans with a tangible experience of the Demonstration Project, increased the visibility of advanced water purification technology, corrected inaccurate perceptions about water purification processes, and solidified relationships with stakeholders.

AWP Facility Tour Publicity

The AWP Facility tours were publicized through email invitations, community event informational booths, newsletter articles, media coverage, email updates, social media posts, speakers bureau presentations, newspaper and online advertisements, and water bill insert announcements.

AWP Facility Tour Graphics

A variety of graphic materials were prepared to create an attractive and educational tour experience. The graphic approach reinforced the idea of the water cycle and used words and images that "connect" the viewer to the subject of water. A palette of colors was selected for the graphics to be representative of water. The backgrounds included graphics of waves and bubbles that implied technology and water purification in a simplified way. Icons were used to enhance and illustrate the AWP Facility process, such as H2O molecule decals.

Schoolchildren try to identify the purified water sample.

One of the main graphic elements used in the tour experience was a PowerPoint presentation featuring an animated video of the water purification process. Posters highlighting existing water purification projects, a San Diego County map for guests to identify where they live, banners displaying the urban water cycle, water-related maps, signposts featuring water-related quotations, signs explaining each step of the multiple barrier process, and a "photo-op" backdrop featuring San Vicente Reservoir were located throughout the facility to provide information and keep guests engaged during the entire tour. A blue pathway guided guests through the AWP Facility. Decals were placed along the pathway to illustrate the purification process. The decals early in the pathway showed water contaminated with a number of microorganisms. As the decals neared the end of the pathway following the three purification steps, they were clear and free of contaminants. All of these materials supplemented the messages expressed verbally by the guides throughout the tour.

AWP Facility Tour Logistics

The tour experience consisted of three main parts: an introduction, a facility tour and a closing. Each tour began with a presentation about the City's water supply situation and explanation of the various project components and treatment processes involved, followed by a tour of the facility with explanations of how the many pieces of equipment work together to create the multiple barrier process. At the conclusion, guests compared samples of recycled water, drinking water, and purified water produced at the facility.

AWP Facility Tour Attendees

Guests registered for the tours through an online registration system. Registrants provided contact information, including email addresses, and how they learned about the tour. Not only was the information collected useful for contacting guests prior to the tour, but it served a secondary purpose in expanding the project contact list. The email addresses collected were added to an interested parties email database for future communications.

San Diego Mayor Jerry Sanders toured the AWP Facility with his staff.

Tours were offered weekly with a Saturday and/or an evening tour offered at least once a month. Organizations also had opportunities to host meetings on site and take a tour of the facility. Since the facility opened, more than 3,200 guests have attended 243 tours. Tour attendees included many local elected officials and decision makers, such as San Diego Mayor Jerry Sanders, San Diego City Councilmembers, mayors of Del Mar and Solana Beach, councilmembers from Oceanside and Solana Beach, Assemblymembers Atkins and Fletcher, Congressman Filner, and staff from the offices of Senator Boxer, Representative Issa, State Senator Anderson, Assemblymembers Block and Jones, the EPA, the Bureau of Reclamation, Department of the Interior, Office of Management and Budget, and the Senate Appropriations Subcommittee for Energy & Water Development[7]. The Demonstration Project attracted City residents as well as international guests from Armenia, Australia, Azerbaijan, Brazil, China, Georgia, India, Iraq, Kyrgyz Republic, Mexico, Moldova, Spain, Tajikistan, Ukraine, the United Kingdom, and Vietnam.

Members of the 416th Civil Affairs Battalion (Airborne) following their AWP Facility tour

In order to further engage visitors following the tour, attendees received an email thank you note with a link to the project's Facebook page where guests could view the tour photographs. Tour participants were added to the database of interested parties to ensure they received periodic updates about the project.

Tour Feedback

Following tours of the AWP Facility, guests completed surveys to evaluate their tour experience and understanding of water purification. This tool is used to gauge the success of the information provided and identify areas of needed improvement for the tour. Based on the findings, nearly all of

[7] Titles listed represent the office held at the time of tour. Some of these elected officials may no longer hold the office listed.

the respondents found the tour to be "very informative" (81.4 percent) or "informative" (18.2 percent), and more than 98 percent of respondents said the overall tour was "excellent" (74.6 percent) or "good" (23.7 percent).

The feedback has resulted in the tour program being adapted to meet visitors' needs and to incorporate suggested improvements. For example, respondents who toured early in the program often reported poor audio quality on the tour. After acquiring a better sound system, the audio quality comments dropped significantly. In addition, guests commented on the lack of accessibility for participants with limited mobility. Based on this feedback, a virtual tour video was created that could be viewed in the tour conference room or from a personal computer. Other feedback led to the development of more child-friendly materials, inclusion of additional props, and fine-tuning of other aspects of the tour.

Youth Outreach

Another facet of the outreach program is the cooperative work done with students throughout San Diego, most notably those at the Elementary Institute of Science. The Elementary Institute of Science Commission on Science that Matters is an innovative program that involves students from San Diego high schools in the study of a topic that will result in greater community sustainability. For the 2011/2012 school year, Elementary Institute of Science students created a video about the water purification process to make the project's technical aspects more understandable and appealing for children. Elementary Institute of Science posted the video on their YouTube page (youtube.com/eiscostm06), and the Demonstration Project social media pages linked to the video. The students presented the video and what they learned about the purification process to NR&C in May 2012.

Following their presentation to NR&C, EIS students pose with Project Director Marsi Steirer.

Outreach to young audiences was incorporated in many aspects of the outreach program. Elementary and high school classes, Boy Scout dens, Girl Scout troops, and home-schooled children toured the AWP Facility. Many higher education groups also toured the facility, including water treatment, engineering, law school, and medical school classes. In addition to the tours, the speakers bureau made presentations about the Demonstration Project to elementary and high school classes. Technical information was geared to a younger audience at youth-oriented events such as the Sally Ride Science Festival, the Girl Scouts World of Water Workshop, the San Diego Science & Engineering Expo, and the Greater San Diego Science & Engineering Fair.

Multicultural Organizations

With the help of multicultural experts, all aspects of project outreach were considered through a multicultural lens. Considerations included conducting one-on-one interviews with community leaders from ethnic or faith-based organizations, producing multilingual materials, distributing news releases and template articles to ethnic media, guiding tours of the AWP Facility for ethnic media representatives, participating in multicultural community events, providing Spanish and Portuguese translators for AWP Facility tours when necessary, and welcoming people of all backgrounds to tour the AWP Facility. This cross-dimensional approach to multicultural outreach ensured diverse audiences were taken into account for all outreach efforts.

Social Media, Conferences and Awards

To promote transparency and project visibility, the outreach program aimed to inform as many City residents as possible about the Demonstration Project. With this goal in mind, social media platforms, email distribution systems, and industry conferences were used to reach a wide variety of people.

Interested Parties

Interested parties who expressed a desire to learn more about the project, either when they visited the website or signed up at events or other outreach activities, were added to a database of email contacts. Other groups, such as stakeholders, media contacts, tour participants, and potential groups for speakers bureau presentations were also included in the database. Contacts were able to easily unsubscribe from email updates if they no longer were interested in the project. After continuously collecting contact information, the database eventually consisted of 3,890 email contacts. The contacts typically received project updates once a month, keeping them informed about the project without bombarding them with emails.

Social Media

Social media sites provided effective opportunities to reach new audiences and maintain contact with existing interested parties. An active social media presence was developed on Facebook, Twitter, and YouTube. The pages were updated and monitored on a daily basis, which included responding to public comments to keep followers engaged. A social media calendar was also developed and updated monthly such that interesting and relevant information could be posted frequently. Community members were encouraged to follow the social media pages at tours and events, on the website, and in newsletters, eUpdates, and other informational materials.

An active social media presence was developed on Facebook, Twitter, and YouTube.

Facebook (www.facebook.com/SanDiegoWPDP)

The latest project information, AWP Facility tour photos, and links to related articles and factoids were posted on the project's Facebook page, adding up to 379 wall posts. The page has received 123 page likes, 12 comments, and 93 likes on page items (e.g., photographs and wall posts).

Twitter (www.twitter.com/PureWaterSD)

Similar yet pithier posts and links were posted on Twitter compared to those posted to Facebook. On Twitter, dialogue about water issues and the Demonstration Project were more readily available, thanks to the social media site's structure. For example, a project mention by Council President Young on Twitter led to dialogue with a community member[8]. Eventually the community member attended the tour and later posted on Twitter about her positive tour experience and her support for the project. The Demonstration Project has 133 followers (i.e., subscribers) of its Twitter page. In addition to the project's own 537 tweets, posts were retweeted 54 times and the project's page was mentioned 75 times by others.

YouTube (www.youtube.com/PureWaterSD)

Project-related videos were posted on the YouTube page, including a virtual tour of the AWP Facility, an animated video explaining the water purification process, project testimonials, and a clip from *California's Gold* with the late Huell Howser that featured the Demonstration Project. The seven videos posted have received a total of 3,121 views. The YouTube page also linked to "favorite" videos posted by other YouTube channels including the video produced by Elementary Institute of Science students and a WateReuse Foundation video about the world's water supply titled *Downstream.*

Seven videos posted about the project on YouTube have received a total of 3,121 views.

Water Agency Collaboration

Although San Diego residents were the primary target audience for project outreach, all of the cities and agencies that receive or could potentially receive (such as in an emergency) drinking water from the San Vicente Reservoir have the potential to be affected by a reservoir augmentation project at San Vicente Reservoir. Water Authority member agencies were kept informed through presentations, meetings, and facility tours. They also received information suitable for sharing on their websites and in outreach materials. All Water Authority member agencies have received information through a presentation or tour.

In addition to providing project information, there was a collaborative effort between the Demonstration Project and the Water Authority. In early 2012, the Water Authority developed a brief video that explained the region's water needs and how full-scale reservoir augmentation could produce a reliable, local drinking water supply. An additional element of this collaboration was a cross-promotion where information was shared about the AWP Facility tours and the Water Authority's San Vicente Reservoir tours at the other's tour program.

[8] Title listed represents the office held at that time.

Trade Shows and Conferences

Since full-scale reservoir augmentation at San Vicente Reservoir would be the first project of its kind in California, the Demonstration Project drew interest from water industry professionals from across the state and the nation. There were 33 presentations made about the technical and outreach aspects of the project at local, national, and international water industry conferences. These presentations increased project visibility and encouraged connections with and learning from experiences of other water industry professionals.

Awards

The Demonstration Project has received recognition for its outreach efforts. In September 2011, the WateReuse Association honored the Demonstration Project as the Public Education Program of the Year for its outreach efforts since inception. The following year in September 2012, the WateReuse Association recognized the Demonstration Project once again, this time as the 2012 Small Project of the Year.

The Demonstration Project has received two awards from the WateReuse Association.

Media Outreach

Effective media outreach required that media representatives receive accurate and timely project information. Information was provided to reporters and editors of local, regional, and national publications, as well as multicultural print publications, online publications, and television and radio outlets at all project milestones. The project has been covered by many media outlets including the *San Diego Union-Tribune, North County Times, Los Angeles Times, USA Today, New York Times, National Public Radio*, and *National Geographic.*

Contact Lists

A comprehensive list of local and national media contacts was developed and information was provided at project milestones and to generate interest in the AWP Facility tour program. News releases and template articles were distributed to various publications: daily newspapers, online media, community newsletters, and trade publications. Members of the multicultural team provided contact information for local, ethnic media representatives and encouraged them to tour the AWP Facility. Stakeholders that have their own publications and newsletters were included in the list.

Media Outreach Activities

There were many components of the media outreach activities. Prior to the opening of the AWP Facility, science reporters were informed about the technical details of the project. This effort resulted in several publications writing about the multiple barrier process before the AWP Facility was operational.

Media representatives were invited to tour the AWP Facility once it became operational. On June 30, 2011, San Diego Mayor Jerry Sanders, Councilmember David Alvarez, Public Utilities Director Roger Bailey, and Demonstration Project Director Marsi Steirer announced the opening of the one-mgd AWP Facility at a news conference covered by reporters and camera crews from local television news stations and several daily print or online publications.[9]

Template articles were prepared to provide project information through community newspapers, stakeholder publications, and local websites and extend the reach throughout the City. The articles were customized as needed for a variety of outlets and updated articles were prepared as the project progressed. A well-publicized template article from early 2012 promoted the AWP Facility tour program, increasing participation in the tours while raising awareness about the project.

A news release highlighting a group's visit to the facility was submitted for consideration in the group's newsletter or appropriate publication. Tours were covered in several organizational newsletters and campus publications, such as Francis Parker School's online news and SOS Toastmasters' monthly newsletter, which may have otherwise not included a story on the Demonstration Project.

Advertisements

Advertisements announcing the AWP Facility opening and the availability of tours were placed in seven local, ethnic publications (*El Latino, Filipino Press, La Prensa, San Diego Monitor, Voice & Viewpoint, We Chinese in America* [weekend edition], and *Giving Back Magazine*) immediately following the facility opening in summer 2011.

Advertisements in local ethnic publications were used to reach out to multicultural

Depending on the publication, the advertisements ranged from one-eighth to one-quarter of a page in size. Spanish text was used for the advertisements placed in Spanish language publications. These advertisements were an important part of reaching out to multicultural audiences.

Additionally, the tour program was advertised in Voice *of San Diego* (VOSD) in June/July 2012 as part of an advertising package. Since the advertisement placement coincided with the release of the newest Spiderman movie and Comic-Con 2012, a three-frame animated advertisement that featured a Demonstration Project informational booth visitor dressed as Spiderman was placed on the *Voice of San Diego* website. The advertisement included phrases about the tour program that played on Spiderman terminology. Additionally, a static advertisement about the tour program appeared eight times

An animated advertisement featuring a Demonstration Project informational booth visitor dressed as Spiderman was placed on the Voice of San Diego website.

[9] Titles listed represent the office held at the time of the news conference.

in the VOSD Best of the Week and Member Report weekly email blasts. Lastly, a quarter-page tour program advertisement ran in the VOSD monthly magazine.

Media Coverage

As one of the first cities in California to pursue full-scale reservoir augmentation, San Diego has been front and center in media coverage for recycled water projects in the U.S. and around the world. The project was featured in local and national newspapers, online and trade publications, and local radio and television stations. The project and the tour program were also featured in community publications. Many affiliated websites provided links to the project website, informational materials or videos. Using established multicultural media contacts, project coverage was generated in African-American, Latino and Asian publications.

In October 2010, the *Union-Tribune* published an article describing water purification and included graphic diagram of the multiple barrier process. This emphasis on the science of water purification reflected what the Demonstration Project was all about. In January 2011, the *Union-Tribune* recalled its previous criticism of water purification as "toilet to tap" with an editorial piece titled "The Yuck Factor: Get Over It". On a national level, the *New York Times* followed suit with an article in February 2012 titled "As 'Yuck Factor' Subsides, Treated Wastewater Flows From Taps." From 2010 to 2012, information has been provided for many articles such as these that have recognized and contributed to the growing understanding of the scientific efficacy of water purification technology and San Diego's need for a local, reliable source of water. Overall, the project received media coverage from more than 100 publications and news outlets locally and nationally.

The New York Times

© 2012 The New York Times FRIDAY, FEBRUARY 10, 2012

As 'Yuck Factor' Subsides, Treated Wastewater Flows From Taps

By FELICITY BARRINGER

SAN DIEGO — Almost hidden in the northern hills, the pilot water treatment plant here does not seem a harbinger of revolution. It cost $13 million, uses long-established technologies and produces a million gallons a day.

But the plant's very existence is a triumph over one of the most stubborn problems facing the nation's water managers: if they make clean drinking water from wastewater, will the yuck factor keep people from accepting it?

With climate change threatening to diminish water supplies in the fast-growing Southwest, more cities are considering the potential of reclaimed water. A new report from the National Academy of Sciences said that if coastal communities used advanced treatment procedures on the effluent that is now sent out to sea, it could increase the amount of municipal water available by as much as 27 percent.

San Diego's success, 12 years after its City Council recoiled from the toilet-to-tap concept, offers a blueprint for other districts considering wastewater reuse.

For most of the four decades beginning in 1970, the arid West was the fastest-growing region in the country; the population of Nevada quintupled in that period while Arizona's nearly quadrupled. Continued population growth, unmatched by growth in water storage capacity, makes this a "new era in water management in the United States," the science group's report said.

"The pressures on water supplies are changing virtually every aspect of municipal, industrial, and agricultural water prac-

Continued on Page A3

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EDITORIAL

THE YUCK FACTOR: GET OVER IT

As San Diego sprawls above 3.5 million people countywide in just 10 more years, and a projected 4.4 million by 2050, the greatest threat to our economic health and quality of life is an uncertain supply of water. This urban cul-de-sac at the bottom of California is at the tail end of the pipelines that deliver 80 percent or more of our water. That means we are heavily dependent on the mercy of others, and that is not comforting.

San Diegans have more than proved themselves willing to conserve; the city uses less water in real terms today than it did with a smaller population 20 years ago. That will continue to be a crucial part of the region's water strategy for decades. So, too, will be the development of new sources, such as desalination. And, of course, political battles to rescue the Sacramento-San Joaquin Delta from environmental collapse in order to keep Northern California water flowing south will be never-ending.

scaping and industrial processes, then purify and scrub it some more to nearly distilled water standards. The demonstration project is to produce 1 million gallons a day for a year, during which it will be continually monitored and studied, but not distributed for public consumption. If it proves safe and affordable, the city could then consider its expansion to a permanent plant that could produce up to 16 million gallons a day, which would be piped to San Vicente Reservoir.

Frankly, there is not that much to demonstrate, at least scientifically.

The project received media coverage from more than 100 publications and news outlets locally and nationally.

News coverage was continually monitored and compiled. Links to relevant news articles were posted on the project website and in eUpdates. A media tracking database noted project coverage by newspapers, radio, television, and blogs. Coverage of the Demonstration Project was generally accurate and discussed the technology to be employed to purify the recycled water.

The commitment to providing accurate, science-based information also resulted in more descriptive language being used by publications. Instead of sensational headlines relying on the inaccurate "toilet-to-tap" moniker, publications used more fact-based headlines. Some examples include *Union-Tribune* articles, such as "Water Recycling Key to U.S. Future" (Jan. 10, 2012), "Boosting Reservoirs with Purified Wastewater?" (May 22, 2012), and "Recycled Water Getting Another Look" (May 23, 2012).

Speakers Bureau

An active speakers bureau gave 132 presentations about the Demonstration Project throughout San Diego and proved to be a vital component of the outreach program. These presentations shared project information with community members and provided an opportunity to receive public feedback about the project and the presentation itself so public questions and perception about water purification in San Diego could be more clearly understood.

In order to ensure an inclusive, broad reach throughout San Diego, an extensive database of community groups with potential interest in the project was created. The list began with groups that received presentations about the Water Reuse Study in 2005 and 2006. Each City Council district office was contacted for recommendations of groups to contact. Presentation scheduling began with the groups recommended by council members, those groups that had been previously involved, and community planning groups throughout the City. Contacts were researched for environmental groups, business associations, religious groups, civic organizations, and other special interest groups. They were then contacted to schedule a presentation. The speakers bureau program provided an opportunity to explain the project components and for community members to ask questions, voice concerns, and obtain accurate information about it.

An active speakers bureau gave 132 presentations about the Demonstration Project throughout San Diego.

The speakers bureau members were tasked with presenting information about the project in community group presentation settings. A PowerPoint presentation was developed to explain San Diego's water supply situation, the components of the Demonstration Project, and how water purification technology works in layperson's terms. The speakers bureau team participated in two workshops to become familiar with the presentation and practiced delivering it and responding to questions. Regular meetings with speakers bureau members were held to discuss feedback from presentations, develop updated presentation slides, and identify questions that should be added to the project FAQ.

The speakers bureau was regularly publicized through all aspects of the outreach program including at community events, at facility tours, on all distributed informational materials, and on the project's website. Contacts in the speakers bureau database were contacted and offered a presentation, responses were provided to presentation inquiries, equipment and materials were prepared, and presenter feedback forms and group evaluations were collected. Any questions and concerns from the group were recorded in the database and follow-up was performed when necessary.

The speakers bureau successfully presented to groups citywide. The groups had various interests, and many group members followed up with a tour of the AWP Facility. Presentations were made to churches, classrooms, multicultural group meetings, water industry luncheons, community planning meetings, environmental symposia, and more. A broad range of groups proved to be interested in the discussion of San Diego's water supply and receptive to the options being explored by the City, particularly the Demonstration Project.

Stakeholder/Partner Communication

Sharing educational information about the project allowed relationships to be formed with stakeholders and a network of contacts to be developed. Once identified, stakeholders were contacted to participate in one-on-one stakeholder interviews, schedule group presentations, place project information in their relevant publications, and tour the AWP Facility. All of the stakeholders were added to the interested parties' database so they would receive regular email updates about the project.

American Assembly

As mentioned previously, in 2004 and 2005 a broad-based group of City residents participated in an American Assembly-style process to review the City's Water Reuse Study findings. The American Assembly members concluded that reservoir augmentation was the most viable use of highly treated recycled water for San Diego and that it could provide a local, reliable supply of water crucial to the City's future.

Because American Assembly participants played such an essential role in the eventual development of the Demonstration Project and were already invested in it, they were immediately identified as key stakeholders. Early in the project, members of the American Assembly were updated about the project status, informed about outreach opportunities, and encouraged to remain involved. In addition to being added to the email update contact list, the American Assembly participants were directly contacted in early 2012 to encourage them to tour the facility or register for a presentation if they had not done so already.

Water Reliability Coalition

Beginning in 2009, a unique union of diverse San Diego organizations came together to form the Water Reliability Coalition (WRC; formerly the IPR Coalition) in support of the Demonstration Project. This independent, broad-based coalition consisted of 23 environmental, technical, business, and ratepayer advocacy groups that promote the exploration of water purification in San Diego (see sidebar for list of organizations). The group was instrumental in maintaining momentum for the Demonstration Project by attending and providing testimony at City Council and other civic meetings. Additionally, they provided an independent voice about water purification and the need for a sustainable water supply for San Diego. In 2010, the San Diego Chapter of WateReuse California presented special recognition awards to each WRC organization in recognition of their support of water reuse, and in particular of water purification in San Diego.

As early supporters of the Demonstration Project, the WRC was updated about the project and invited to tour the AWP Facility. The Water Reliability Coalition's role was to provide their own opinion about the project as a non-governmental group. Additional information about the WRC can be found at www.sdwatersupply.com.

WRC
WATER RELIABILITY COALITION

Coalition Members:
- BIOCOM
- Building Industry Association of San Diego
- Building Owners and Managers Association, San Diego Chapter
- Citizens Coordinate for Century 3
- Coastal Environmental Rights Foundation
- Empower San Diego
- Endangered Habitats League
- Environmental Health Coalition
- Friends of Infrastructure
- Industrial Environmental Association
- National Association of Industrial and Office Properties, San Diego Chapter
- San Diego and Imperial Counties Labor Council
- San Diego Audubon Society
- San Diego Regional Economic Development Corporation
- San Diego Coastkeeper
- San Diego County Apartment Association
- San Diego County Taxpayers Association
- San Diego Regional Chamber of Commerce
- San Diego River Park Foundation
- Sierra Club, San Diego Chapter
- Surfrider Foundation, San Diego Chapter
- Sustainability Alliance of Southern California
- Utility Consumers' Action Network

Stakeholders

As mentioned previously, a number of community leaders were identified and interviewed in one-on-one meetings to gather their feedback on relevant water issues. A broad range of perspectives was sought from all sectors of the community since every industry, group, and individual is affected by the City's water supply. Stakeholder organizations were engaged, including construction, industrial, medical, education, business, and tourism sectors. To ensure the interests and concerns of all San Diego residents were captured, multicultural organizations and leaders in multicultural communities were sought to participate in the stakeholder interview process.

Following the interviews, the relationships with the community leaders and their organizations were reinforced in several ways: providing them with information requested during the interview, sharing template articles for inclusion in their organizational outreach materials, encouraging them to host a speakers bureau presentation, and inviting them to tour the AWP Facility.

Information Lines and Emails

To promote two-way communication, project telephone information lines and an email address were set up to allow community leaders to contact project staff easily. Three information lines were set up for overall project questions, speakers bureau registration, and tour information, respectively. Also, an email address (PureWaterSD@sandiego.gov) was promoted as the point of contact for all project-related questions and concerns.

The project received, responded to, and tracked 182 email and telephone inquiries from members of the public who inquired about it and requested presentations and tours, in addition to members of the public who requested tours by email. Each email and telephone inquiry was tracked on a form that recorded contact information and the information requested. The outreach hotlines were useful for providing a central contact point for the public. The goal was to respond to telephone and email inquiries within one business day. If a question required a more technical response, technical staff assisted in developing an accurate response that addressed the contact's concerns.

Internal Department Communications

The City of San Diego Public Utilities Department's 1,414 staff members were an important audience for the Demonstration Project since they could be asked about it while working in the field, responding to customer service inquiries, attending or staffing community events, or talking with their own friends and family. Therefore, internal audiences were kept informed about the project and provided with as much information as possible.

Internal Meetings

Information about the project was presented to Public Utilities staff at internal division meetings. Since all of the division staff were invited to and typically attended these meetings, many internal staff could be reached at once. The presentations explained project details and answered questions for an audience with unique interests that varied from those of the general public.

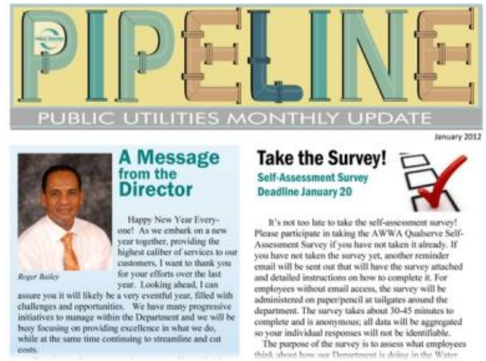
Project information was also shared at a series of three tailgate trainings, which are required classes for field personnel. Prior to the presentation, attendees were tested to determine their water purification knowledge. Following the presentation, the attendees were tested again to show what they learned through the presentations.

Intranet

The Public Utilities Department houses its own intranet site its staff. The site provides employee resources, department information, and related news. Information about AWP Facility tours and the virtual tour video are posted on the Intranet page. Also, the project's Pure News newsletters were posted on the intranet's page of Public Utilities Department newsletters.

Pipeline

Pipeline is the Public Utilities Department's internal monthly newsletter. It is emailed to Public Utilities staff, posted in break rooms, and available on the department's intranet page. Project updates, City staff tour invitations, and general information are submitted for inclusion in Pipeline, as necessary. Overall, information about the Demonstration Project was included in 14 issues of *Pipeline*.



PIPELINE

PUBLIC UTILITIES MONTHLY UPDATE

January 2012

A Message from the Director

Happy New Year Everyone! As we embark on a new year together, providing the highest caliber of services to our customers, I want to thank you for your efforts over the last year. Looking ahead, I can assure you it will likely be a very eventful year, filled with challenges and opportunities. We have many progressive initiatives to manage within the Department and we will be busy focusing on providing excellence in what we do, while at the same time continuing to streamline and cut costs.

Roger Bailey

Take the Survey!

Self-Assessment Survey Deadline January 20

It's not too late to take the self-assessment survey! Please participate in taking the AWWA Qualserve Self-Assessment Survey if you have not taken it already. If you have not taken the survey yet, another reminder email will be sent out that will have the survey attached and detailed instructions on how to complete it. For employees without email access, the survey will be administered on paper/pencil at tailgates around the department. The survey takes about 30-45 minutes to complete and is anonymous; all data will be aggregated so your individual responses will not be identifiable.

The purpose of the survey is to assess what employees

Information about the Demonstration Project was included in 14 issues of Pipeline, the Public Utilities Department's internal monthly newsletter.

City Staff Tours

To address the unique interests and concerns of Public Utilities Department staff, 16 AWP Facility tours were provided for City staff only. These tours were publicized through internal emails, Pipeline, and on the intranet. Public Utilities supervisors and supervisors in other City departments, such as Storm Water, requested additional tours to accommodate their staff members. These tours proved valuable in educating a large number of City staff about the project and providing in-depth information to them.

Public Utilities Department staff tour the AWP Facility.

Public Outreach and Education Findings

Key findings of the public outreach and education program are as follows:

- Feedback from individuals who have toured the AWP Facility shows that providing an opportunity to tour the facility increases understanding about water purification processes.
- Research shows a steady increase from 2004 (26 percent) to 2011 (68 percent) to 2012 (73 percent) in City residents who favor using advanced treated recycled water as an addition to the City's drinking water supply.

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Section F: Full-Scale Project Considerations

Full-Scale Reservoir Augmentation Considerations

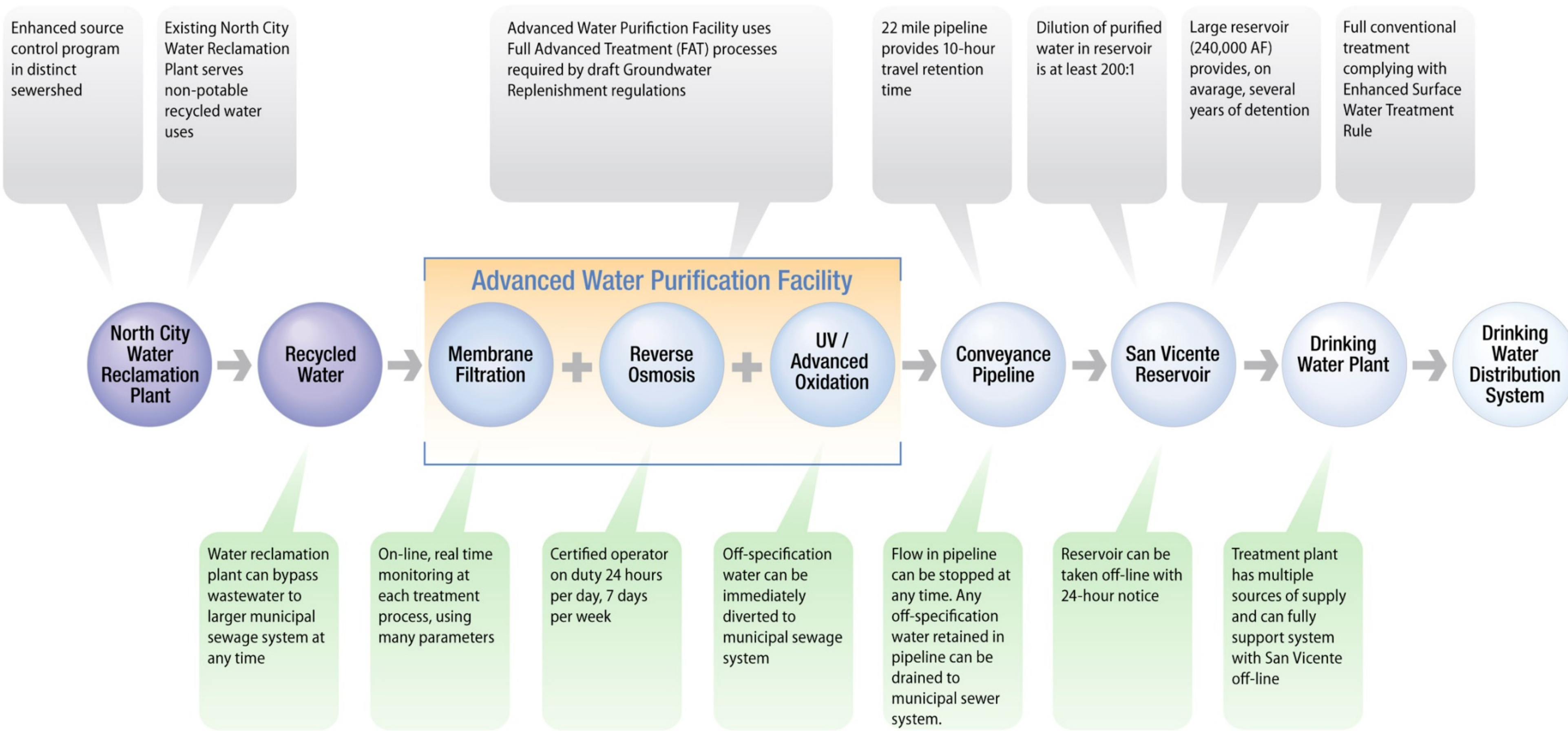
- Full-Scale Components of a Multiple Barrier Strategy
- Source Control Enhancement
- North City Water Reclamation Plant
- Advanced Water Purification Facility
- Pipeline System
- AWP Facility and Pipeline System Cost Estimates

The City must fully understand all potential implications of a reservoir augmentation project at San Vicente Reservoir prior to deciding whether or not to implement such a project. The Demonstration Project included an assessment of the full-scale project components that would be required, and an evaluation of potential operational requirements and other considerations associated with each component. The results of that assessment are summarized in this section.

Full-Scale Components of a Multiple Barrier Strategy

A reservoir augmentation project at San Vicente Reservoir would require a series of water purification components, focused on achieving a multiple barrier strategy, as required for regulatory approval. A multiple barrier strategy protects public health by incorporating safeguards to ensure that a failure or error at any given treatment step would not compromise public health. The components of a multiple barrier strategy that would be implemented for reservoir augmentation at San Vicente Reservoir are illustrated in Figure F-1 and described in further detail below. Please note that, although a full-scale project's multiple barrier strategy includes San Vicente Reservoir and a municipal drinking water treatment plant such as the Alvarado Water Treatment Plant, these facilities would not require modification. As such, those steps of the multiple barrier strategy are not addressed in this section.

Figure F - 1: Components of a Multiple Barrier Reservoir Augmentation Project at San Vicente Reservoir



Source Control Enhancement

The first step in the multiple barrier strategy for reservoir augmentation at San Vicente Reservoir would be source control, which refers to the prevention of contaminants from entering the wastewater stream. All wastewater systems have source control programs. The City's source control program, referred to as IWCP, was implemented in 1982 to regulate industrial discharges into the San Diego Metropolitan Sewage System (Metro System). The program was required as part of the NPDES permitting process for Point Loma, and the South Bay Water Reclamation Plant (SBWRP). The IWCP applies and enforces federal pretreatment regulations set forth by the EPA, and it satisfies the following objectives:

- To protect and improve receiving water quality;
- To prevent the discharge of toxic and potentially harmful pollutants in concentrations which would interfere with treatment plant operations or pass through the plant to the receiving waters;
- To protect system personnel and plant facilities by limiting discharges of potentially hazardous, harmful, or incompatible pollutants;
- To prevent contamination of treatment plant sludge in order to maximize beneficial reuse options for biosolids;
- To protect the quality of recycled water.

The City participates in the "No Drugs Down the Drain" program, which alerts California residents about problems associated with flushing medications down the drain. This program is an example of the City's existing source control efforts.

The City's IWCP is designed to support the existing discharge to the ocean via Point Loma, and goes beyond typical source control programs by implementing an EPA- and Regional Board-approved Urban Area Pretreatment Program (UAPP). The City has taken the following steps in implementing the UAPP that extend beyond typical source control programs:

- Developed local limits that comply with UAPP provisions of the Ocean Pollution Reduction Act; local limits are re-evaluated annually.
- Implemented Industrial Management Practices to minimize the discharge of toxic pollutants, such as Batch Discharge approvals, and solvent management plan requirements at all laboratories, including research and development, medical, and analytical laboratories.
- Include prohibitions on the discharge of pharmaceutically-active ingredients, including unused pharmaceuticals, expired pharmaceuticals, rejected batches or lots, and

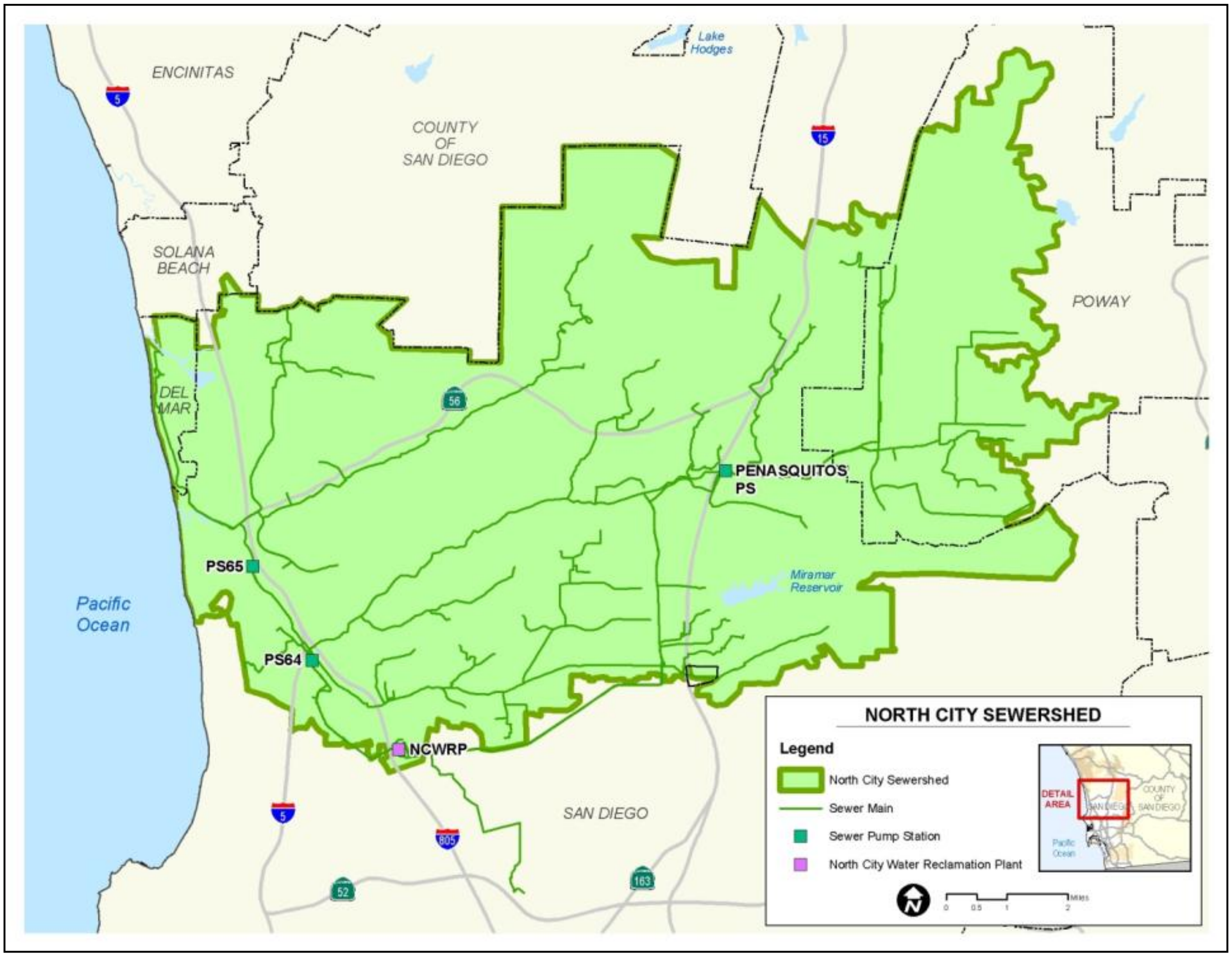
pharmaceuticals received in take-back programs in new and renewal permits for medical and biotech facilities tributary to North City.

- Require facilities that generate biohazardous waste to comply with the July 2005 California Medical Waste Management Act and revisions and amendments thereto, set forth in the California Health and Safety Code, Sections 117600 – 118360. Facilities must certify every six months as to compliance with the pharmaceutical discharge prohibition and biohazardous waste management requirements. The Program has procedures in place to evaluate the need for additional controls, and to develop and enforce new local limits and facility or sector-specific Industrial Management Practices as needed to ensure and maintain required effluent quality.

For projects where purified water would enter the drinking water system via groundwater or surface water augmentation, CDPH requires that source control programs be augmented to address residential and commercial discharges and consider an expanded set of contaminants that may have public health relevance, such as industrial chemicals, pharmaceuticals, and personal care product residuals sometimes found in wastewater.

Because the source of purified water for potential reservoir augmentation at San Vicente Reservoir is North City, that facility's service area would be the focus of an enhanced source control program. Figure F-2 depicts the North City service area.

Figure F - 2: North City Service Area



In order to identify potential supplements to the City's IWCP to address possible regulatory requirements associated with a potential reservoir augmentation project, the City reviewed the existing source control program being implemented by OCSD. OCSD's Source Control Program was enhanced to support the currently operational Orange County GWRS, which employs water purification processes similar to those that would be implemented for reservoir augmentation at San Vicente Reservoir. Comparison with OCSD's program illustrated that the City's existing program is robust and goes beyond applicable regulatory requirements for ocean discharges. However, based on that review and the heightened vigilance required to protect drinking water systems, it was concluded that the following components should be considered, should the City pursue reservoir augmentation at San Vicente Reservoir.

- **Chemical Inventory Program and GIS Tracking.** The City may need to implement an expanded industrial and commercial discharger chemical inventory database, which is linked to discharger locations that are tracked using GIS.
- **Pollutant Prioritization Program.** The City may be expected to develop a program to prioritize pollutants through sampling and characterization of CECs at the full-scale AWP

facility and determine if pollutants can be controlled through targeted source control for individual dischargers or commercial sectors.

- **Local Limits Evaluation.** To support a full-scale reservoir augmentation project at San Vicente Reservoir, a local limits evaluation may need to be performed for the North City service area, taking into consideration compliance criteria established by regulatory agencies. Local limits are wastewater limitations that apply to commercial and industrial facilities that discharge to a common treatment plant. They are developed to meet the source control program objectives and site-specific needs of the local treatment plant and its receiving waters. The evaluation would consider including additional pollutants of concern (POCs) on North City's list of local limits, and potentially lowering the limit of pollutants already on the list. An annual re-evaluation of the limits may be necessary to ensure compliance with new and evolving regulations for purified water. This evaluation could be done in conjunction with the annual local limits evaluation for Point Loma.

North City Water Reclamation Plant

North City would be a key component of a reservoir augmentation project at San Vicente Reservoir, providing conventional wastewater and tertiary water treatment technologies to water feeding the AWP facility. North City has been operating since 1997, and has a current design capacity of 30 mgd based on an annual average daily inflow rate; however, North City was master-planned for expansion to 45 mgd (City of San Diego 2012b). The IAP noted that North City already has complex reliability features, including conservative operating criteria and flow equalization, to support a reservoir augmentation project at San Vicente Reservoir.

North City is an existing facility that would serve as a key component of a full-scale reservoir augmentation project by providing recycled water to a full-scale AWP Facility.

No physical modification would be necessary for North City as part of a reservoir augmentation project at San Vicente Reservoir, although some operational adjustments could be made, including use of different chemicals and adjustment of certain operating procedures to complement the operation and performance of the full-scale AWP facility.

Full-Scale Advanced Water Purification Facility

As explained in Section B, Advanced Water Purification Facility*,* the City operated the AWP Facility for one year, producing one mgd of purified water using the same process components that would be used in a full-scale AWP facility. Operating the AWP Facility enabled the City to identify recommendations for design of a full-scale AWP facility (CDM Smith and MWH, 2013a). The full-scale components and design considerations identified as part of the Demonstration Project are summarized below.

Facility Components

The full-scale AWP facility would include the same general process components as the AWP Facility, as well as additional components necessary to address water quality and testing results from the AWP Facility. Table F-1 identifies the necessary full-scale AWP facility components and identifies which components were demonstrated at the one-mgd AWP Facility.

Production Capacity

An analysis was conducted to define an initial capacity for the full-scale AWP facility. That analysis evaluated the overall capacity of North City and recycled water availability considering existing irrigation and industrial users. Due to the seasonal variation in demand from existing recycled water users (more irrigation demand occurs in the summer months), more purified water would be available to augment San Vicente Reservoir during winter months. The initial full-scale AWP facility production capacity was determined to be 18 mgd. Average production (15 mgd) is expected to be slightly lower than maximum treatment capacity (18 mgd) because production will vary throughout the year due to seasonal fluctuations in recycled water demand and routine maintenance requirements. During periods of low recycled water demand, production would reach full production capacity, while in months of peak recycled water demand, it will be less than capacity, averaging approximately 15 mgd on a year-round basis.

Based on the full-scale capacity analysis, preliminary design criteria were developed for an 18-mgd capacity facility. The capital cost estimates presented later in this section are based on an 18-mgd maximum treatment capacity, because the infrastructure needs to be sized to be capable of delivering the maximum production of 18 mgd. The operations and maintenance (O&M) cost estimates are based on an annual average production of 15 mgd, because this is the average expected production for which annual, ongoing expenses will be incurred.

This production capacity analysis is summarized in the Full-Scale Reservoir Augmentation Capacity Analysis Technical Memorandum (RMC, 2011). The City updated this technical memorandum in January 2013.

Site Location and Layout

The full-scale AWP facility would be located on 10.3 acres of vacant City-owned property immediately north of North City. The site layout for the full-scale AWP facility was developed to locate the administrative building on the south side of the facility for visitor access. Process areas not enclosed in a building would be installed under canopies. A pipe gallery/access tunnel would be provided under Eastgate Mall Road, connecting North City to the full-scale AWP facility just west of the guard shack. Figure F-3 presents the preliminary site layout and location for the full-scale AWP facility.

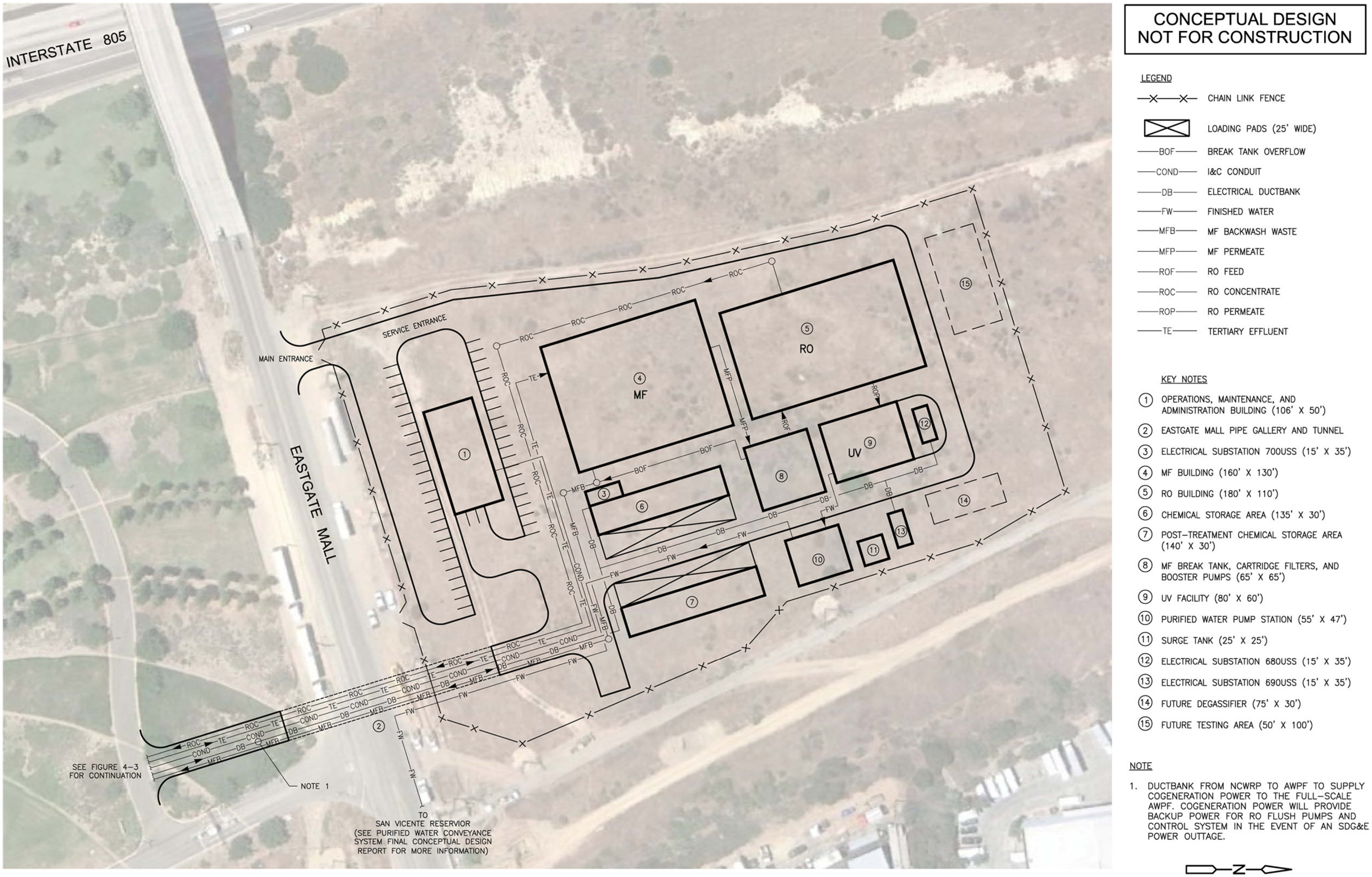
Table F - 1: Full-Scale AWP Facility Components

Full-Scale AWP Facility Component	Demonstrated at 1- mgd AWP Facility?	Purpose
Pump station to send North City water to the full-scale AWP facility	No	A new pump station would need to be constructed to pump water from North City to the full-scale AWP facility site.
Pre-treatment chemical addition	Yes	Pre-treatment would continue to be applied for the full-scale system to reduce contaminants that may harm the AWP Facility equipment.
Membrane filtration (either microfiltration or ultrafiltration)	Yes	Membrane filtration would continue to be the first stage in the water purification process for the full-scale AWP facility.
Membrane filtration break tank	Yes	A membrane filtration "break tank" would continue to be used to hold water before it is sent to the reverse osmosis system. This will help to stabilize flows.
Reverse osmosis booster pumps	Yes	"Booster pumps," pump stations used to move water from the membrane filtration to the reverse osmosis process, would continue to be used.
Reverse osmosis pre-treatment chemical addition	Yes	Pre-treatment before the reverse osmosis stage would continue to be applied to reduce contaminants that may harm the reverse osmosis membranes.
Cartridge filters	No	Cartridge filters would be added to help protect the reverse osmosis membranes.
Reverse osmosis feed pumps	Yes	"Feed pumps," send water into the reverse osmosis system would continue to be used to directly control the pressure of water entering the reverse osmosis system.
Reverse osmosis system	Yes	A reverse osmosis system would continue to be the secondary and main stage in the water purification process for the full-scale AWP facility.
UV disinfection/advanced oxidation using UV light with hydrogen peroxide	Yes	An UV disinfection/advanced oxidation system would continue to be the third and final stage in the water purification process for the full-scale AWP facility.
Post-treatment/ stabilization chemical addition	No	Post-treatment would be added for the full-scale AWP facility system. This step will include adding treatment chemicals to stabilize the purified water and ensure that it does not have corrosive properties that could potentially damage the conveyance pipeline to San Vicente Reservoir.
Purified water pump station	No	A purified water pump station would be added to transport purified water from the full-scale AWP facility to San Vicente Reservoir.
Operations Center	No	An operations center building would be added to conduct necessary operations and testing procedures for the full-scale AWP facility.

Footnotes:

1. Yes indicates the component was demonstrated by the AWP Facility. No indicates that, while not demonstrated by the AWP Facility, the component would be necessary for a full-scale facility.

Figure F - 3: Preliminary Layout and Location for the Full-Scale AWP Facility



System Controls, Reliability, and Redundancy

North City treats wastewater flows that would otherwise be treated at Point Loma. Flows to North City can be diverted to Point Loma, allowing North City to be shut down or taken "offline" any time. Point Loma can therefore serve as a back-up system, where flows can be sent from the North City service area when needed. The full-scale AWP facility would be able to be taken offline by halting delivery of recycled water from North City. Although the full-scale AWP facility would have the ability to be shut down at any time, facility design would need to include standard redundancy features that would allow the full-scale AWP facility to continue to operate at its optimal capacity when a particular process unit was offline for maintenance or cleaning.

Continuous monitoring and the ability to immediately shut down the full-scale AWP facility are critical components of the overall reliability of water purification processes. Instrumentation and automation would be provided to continuously verify that processes are operating as expected. The control system would include electronic monitoring that would automatically shut down the facility if a problem was detected. This would prevent water that does not meet the water quality requirements from being introduced into San Vicente Reservoir. Manual checks would also be performed on each system to identify operational trends and detect anomalies that require attention. These electronic systems controls and manual procedures, together with critical control point monitoring (see Section B, Advanced Water Purification Facility), would assure that only the highest quality water leaves the full-scale AWP facility.

Pipeline System Components

The City's Water Repurification Project efforts in the 1990s generated a conceptual pipeline (conveyance) system for a reservoir augmentation project that would convey purified water from North City to San Vicente Reservoir. However, because conditions have changed substantially since the Water Repurification Project was completed, a new conveyance study was required to analyze how water could be conveyed from the full-scale AWP facility (North City) to San Vicente Reservoir. In 2012, a conceptual design study was completed to update recommendations for the purified water conveyance system, including potential pipeline alignments and pump station specifications (RMC, 2012). The new conveyance study also comprehensively analyzed conditions that have changed since the Water Repurification Project was completed. In addition, the conceptual design provided estimates of the associated capital and operations and maintenance costs for the pipeline system components.

Components of the purified water pipeline system would include:

- Purified water pump station
- Purified water pipeline
- Reservoir inlet structure

An overview of the findings from the conceptual design study, including potential pipeline alignments and operational features of the pipeline and purified water pump station, are provided below.

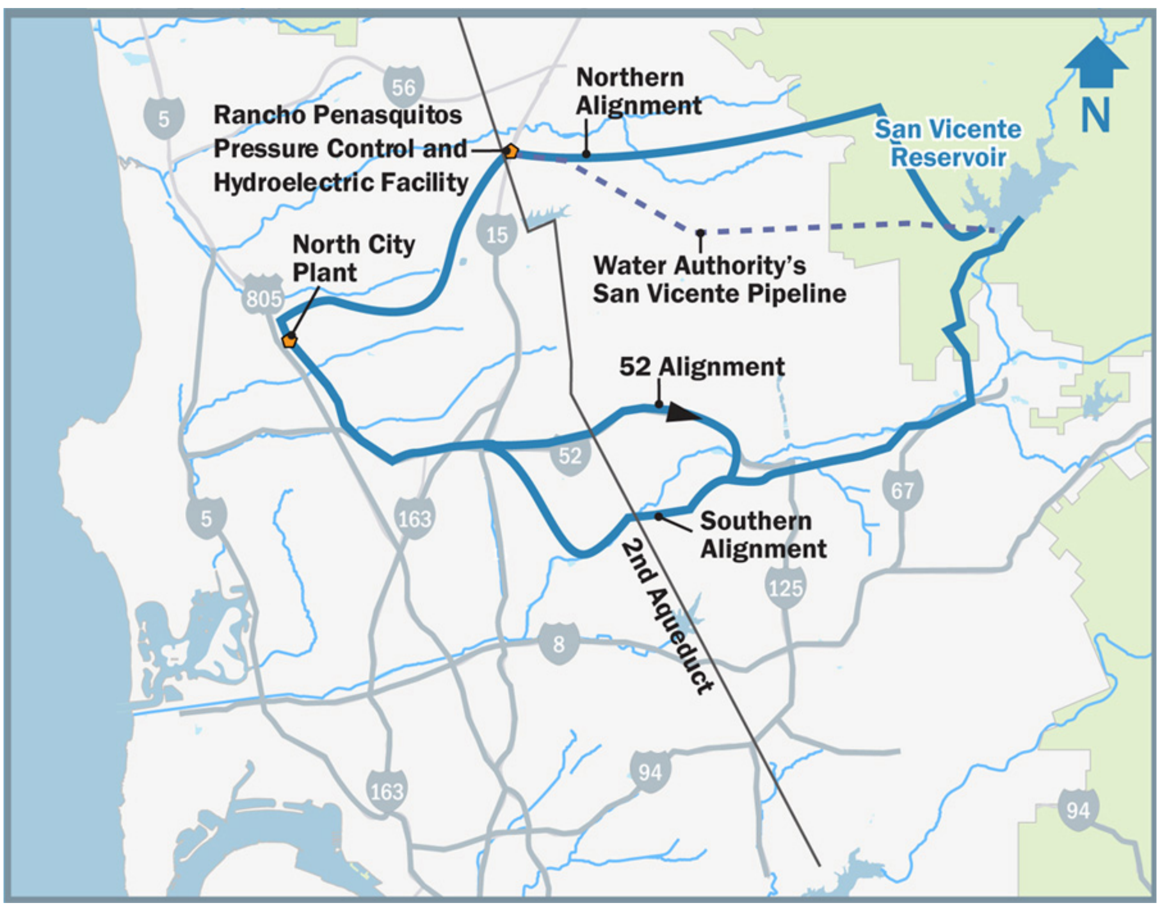
Purified Water Pump Station

A new pump station would be required at the full-scale AWP facility to transport purified water through the pipeline to San Vicente Reservoir. The capacity of this pump station would match the operating range of the AWP facility, with the potential to expand as necessary. Preliminary recommendations for pump types and clear well capacity (needed to counterbalance AWP facility production and pump station operation) were also provided in the conveyance conceptual design study.

Purified Water Pipeline

A series of alternative pipeline alignments to convey purified water from the full-scale AWP facility to San Vicente Reservoir were evaluated. These alignments are described below, and the potential location of these alignments is illustrated in Figure F-4.

Figure F - 4: Potential Purified Water Pipeline Alignments



Northerly Alignments

Two northerly alignments were considered to transport purified water to San Vicente Reservoir, referred to as the northern alignment and the San Vicente Pipeline alignment. The northern alignment, originally evaluated during the Water Repurification Project, is approximately 24 miles long, and follows city streets from North City to the Water Authority's Rancho Peñasquitos

Pressure Control and Hydroelectric facility, which is adjacent to the Second Aqueduct near Mercy Road and Black Mountain. From there, the alignment travels along Pomerado Road to Spring Canyon Road to Scripps Poway Parkway, then south along Highway 67, with a purified water inlet structure near the First Aqueduct inlet structure at San Vicente Reservoir. The close proximity of the purified water inlet to the First Aqueduct inlet structure could pose a challenge, as it would reduce reservoir retention time and blending, which are required to satisfy regulatory requirements. The alignment also traverses challenging terrain, and an encroachment permit would be required from Caltrans to place the pipe in the Highway 67 right-of-way. This alignment should be studied further in the preliminary design phase.

San Vicente Pipeline Alignment

The second northern alignment, the San Vicente Pipeline, is a connection to an existing pipeline that is operated by the Water Authority as part of the region's Emergency Storage Project. The Emergency Storage Project was implemented to connect a network of reservoirs, pipelines, and other facilities that can be used to store and move water throughout the San Diego region in the event of a natural disaster such as an earthquake or drought. The San Vicente Pipeline is 11 miles in length, and connects the Second Aqueduct, which supplies imported water to the west side of San Diego County, to San Vicente Reservoir. Due to the proximity of the San Vicente Pipeline to North City, the fact that it connects to San Vicente Reservoir, and the expected limited use of this pipeline (expected to be used primarily under emergency conditions), this pipeline was considered as a potential pipeline option for a reservoir augmentation project at San Vicente Reservoir. Approximately 10 miles of new pipeline would be needed to connect to the existing 11-mile San Vicente Pipeline.

Through meetings with the Water Authority, it was determined that the San Vicente Pipeline not only conveys water to San Vicente Reservoir, but is also used to convey water directly to the Morena Pipeline and Helix Water District Pipeline, both of which supply imported water directly to the Helix Water District's Levy Water Treatment Plant. Due to this direct connection to the Levy Water Treatment Plant (lacking an environmental buffer), use of the San Vicente Pipeline to convey purified water to San Vicente Reservoir could not be considered during the Demonstration Project.

It is recognized that, should the Water Authority and Helix Water District make other arrangements to transport water from the Second Aqueduct to the Levy Water Treatment Plant, a purified water conveyance strategy including the San Vicente Pipeline could be feasible from a regulatory standpoint. Should the City decide to proceed with a full-scale project, it is recommended that this option be further explored. Further, in the event that regulatory conditions change such that an environmental buffer is no longer required between a purified water source and a drinking water system, use of the San Vicente Pipeline could become feasible from a regulatory perspective.

Southerly Alignments

Purified water conveyance research conducted during the Water Repurification Project in the 1990s focused primarily on a southerly alignment. This alignment included use of the existing recycled water pipeline serving the Metropolitan Biosolids Center and other customers to the southeast of

North City. In addition, it relied on a longitudinal encroachment of a Caltrans right-of-way along State Route 52 (SR-52) and construction of a pipeline along Mast Boulevard in the Santee area. This alignment was re-evaluated as part of the Demonstration Project. Significant changes have occurred along this pipeline alignment since the 1990s. As a result of these changes, the City investigated two alternative southerly alignments for a purified water pipeline: the original approximately 22-mile alignment, including a SR-52 encroachment, and an approximately 23-mile alternative alignment through Mission Gorge that avoids SR-52. Based on the updated analysis conducted as part of the Demonstration Project, a southerly alignment appears to provide the best opportunity to convey purified water from North City to San Vicente Reservoir. Consequently, the cost estimate presented in the following section is representative of a southerly alignment. At the current level of planning and cost estimation, there is no appreciable difference in costs between the two southerly alignments.

Construction Impacts

Construction along any of the potential alignments would require stream crossings and analyses of adjacent native habitat and cultural resources. In addition, construction could potentially generate traffic, noise, and other environmental impacts, depending on its location and magnitude. Moving forward, additional environmental analyses will be required to determine specific features of each alignment such as potential impacts to biological, cultural, and other resources, which would make one alternative superior over the other from an environmental impact point of view.

Pipeline Draining

CDPH would require that purified water from a full-scale AWP facility be captured and prevented from entering San Vicente Reservoir in the unlikely event of a problem at the full-scale AWP facility. The pipeline transporting purified water to the reservoir would be generally on an uphill slope, facilitating the capture and diversion of flows away from San Vicente Reservoir if necessary. In a reservoir augmentation project at San Vicente Reservoir, drain lines would be included in the pipeline system design to enable off-specification flows to be diverted to local sewer systems. Along a southern alignment, this reliability feature would require the diversion of flows to both Santee and San Diego sewer systems.

Purified Water Inlet Structure

The purified water inlet structure would enable purified water to be released from the conveyance pipeline into San Vicente Reservoir. The inlet structure would be positioned at an elevation that would always remain above the surface of the water in the reservoir, and it would include a spillway. Engineering studies conducted in the 1990s provided a preliminary design for this inlet structure, which was reviewed as part of the Demonstration Project. This inlet structure is still feasible.

A series of purified water inlet locations were studied as part of the Reservoir Study conducted by Flow Science (refer to Section C, San Vicente Reservoir Study for more information). While all locations studied were determined to meet regulatory requirements for blending and travel time, a conservative location on the southeast edge of the reservoir (the Design Purified Water Inlet Location) was used as the basis for estimating conveyance pipeline costs.

AWP Facility and Pipeline System Costs

AWP facility and pipeline system costs were evaluated in terms of overall capital and O&M costs; unit costs, which reflect the capital and O&M costs spread over the project life and presented in terms of cost per AF of water produced; and effects on an average monthly household water bill. Avoided wastewater system costs were also quantified. These costs are described below.

Capital and O&M Costs

Capital and O&M costs for the AWP facility and purified water pipeline system are presented in Tables F-2 and F-3, respectively. These cost estimates were based on preliminary facility engineering, and would be updated during final design should the City decide to move forward with a full-scale project. Costs for the purified water pipeline system were developed as part of the Conveyance Conceptual Design Study, and costs for the full-scale AWP facility were developed as part of the Advanced Water Purification Facility Study (CDM Smith and MWH, 2013a). Total capital costs for a reservoir augmentation project at San Vicente Reservoir are estimated to be approximately $369 million, with O&M costs estimated to be $15.5 million per year.

Table F - 2: AWP Facility and Purified Water Pipeline System Preliminary Capital Cost Estimate

Parameter	Capital Cost[1]
AWP Facility Construction Costs	
AWP Facility Influent Pump Station	$2,800,000
Site Civil/Yard Piping	$5,800,000
Operations, Maintenance, and Administration Building	$1,600,000
Membrane Filtration Break Tank and Pump Station	$4,000,000
Chemical Storage Area #1 (Pre-Treatment Chemical Facility)	$2,400,000
Membrane Filtration Facility	$25,300,000
Reverse Osmosis Facility	$21,300,000
UV Disinfection and Advanced Oxidation System	$9,900,000
Chemical Storage Area #2 (Post-Treatment Chemical Facility)	$2,100,000
AWP Facility Construction Subtotal	**$75,200,000**
Contingency (30% of Construction Total)	$22,600,000
Insurance, Bonds, Overhead & Profit	$12,700,000
AWP Facility Construction Total	***$110,500,000***
AWP Facility Implementation Costs	
Engineering & Pre-Construction (20% of Total Construction Cost)[2]	$22,100,000
Environmental Documentation and Mitigation	$1,000,000
Construction Management (10% of Total Construction Cost)	$11,100,000
AWP Facility Implementation Total	***$34,200,000***
Total AWP Facility Capital Cost (Construction Total + Implementation Total)	**$144,700,000**
Purified Water Pipeline System Construction Costs	
Purified Water Pump Station	$8,000,000
Purified Water Pipeline	$114,200,000
Pipeline System Construction Total	***$122,200,000***
Pipeline System Implementation Costs	
Contingency (30% of Construction Total)	$36,700,000
Engineering & Construction Management (30% of Construction Total)[2]	$36,700,000
Environmental Documentation and Mitigation	$24,400,000
Land Acquisition	$4,500,000
Pipeline System Implementation Total	***$102,300,000***
Total Pipeline System Capital Cost (Construction & Implementation)	**$224,500,000**
Total Capital Cost (Construction + Implementation + Source Control)	**$369,200,000**

1. Costs for the purified water pipeline system were developed as part of the conveyance conceptual design study, and costs for the full-scale AWP facility were developed as part of the Advanced Water Purification Facility Study (CDM Smith and MWH, 2013a).
2. Includes costs associated with regulatory compliance and permitting.

Table F - 3: AWP Facility and Purified Water Pipeline System Preliminary O&M Cost Estimate

Parameter	Annual O&M Cost[1]
Power Costs	
AWP Facility Influent Pump Station	$306,000
Membrane Filtration System	$43,000
Reverse Osmosis System	$1,614,000
UV Disinfection and Advanced Oxidation System	$185,000
Miscellaneous Equipment	$7,000
Buildings	$481,000
Purified Water Pump Station	$1,657,000
Power Costs – Subtotal	***$4,293,000***
Chemical Costs	
Membrane Filtration Pretreatment	$223,000
Reverse Osmosis Pretreatment	$431,000
Hydrogen Peroxide for Advanced Oxidation	$216,000
Post Treatment	$358,000
Membrane Cleaning	$103,000
Chemical Costs – Subtotal	***$1,331,000***
Replacement of Consumables	
Membrane Filtration Membranes	$441,000
Reverse Osmosis Cartridge Filters and Reverse Osmosis Membranes	$319,000
UV Lamps and Ballasts	$281,000
Replacement of Consumables – Subtotal	***$1,041,000***
AWP Facility Maintenance Costs	***$1,409,000***
Treatment at North City to Support AWP Facility[2]	***$3,965,000***
Purified Water Pump Station Maintenance Costs	***$228,000***
Purified Water Pipeline Maintenance Costs	***$1,500,000***
Other Annual Costs (Compliance Testing and Security)	$310,000
Annual Labor Costs	$1,418,000
Total Annual O&M Cost	**$15,495,000**

1. Costs for the purified water pipeline system were developed as part of the conveyance conceptual design study, and costs for the full-scale AWP facility were developed as part of the Advanced Water Purification Facility Study (CDM Smith and MWH, 2013a).
2. Cost to increase North City tertiary water production above what is needed to meet non-potable recycled water demands.

Auxiliary Program Costs

Additional auxiliary program costs to support a full-scale project are presented in Table F-4. These cost estimates were based on preliminary cost estimates for a source control program and a public outreach program. Costs for the Source Control Program were developed as part of the Enhanced Source Control Plan for the Full-Scale Advanced Water Purification Facility Technical Memorandum (RMC, 2013).

Table F - 4: Auxiliary Program Cost Estimate

Parameter	Auxiliary Cost
Auxiliary Upfront Cost	
Source Control Program Upfront Cost[1]	$500,000
Auxiliary Annual Cost	
Source Control Program Annual Costs[2]	$50,000
Public Outreach Annual Program Costs[3]	$700,000

1. Source control upfront costs include a chemical inventory program and GIS tracking database (approximately $50,000), a pollutant prioritization program to be completed by existing City staff (approximately $50,000 for initial set-up work), and a local limits evaluation for North City (approximately $400,000). For additional information on source control program costs, refer to the Enhanced Source Control Plan for the Full-Scale Advanced Water Purification Facility Technical Memorandum (RMC, 2013).
2. Source control annual costs include $25,000/yr for annual updates to the chemical inventory program and GIS tracking database, an average of $10,000/yr for periodic updates to the pollutant prioritization program, and $15,000/yr, on average, for updates to the local limits analysis. For additional information on source control program costs, refer to the Enhanced Source Control Plan for the Full-Scale Advanced Water Purification Facility Technical Memorandum (RMC, 2013).
3. Public outreach annual costs include initial start-up of outreach efforts. Annual public outreach costs will be scaled back following full-scale reservoir augmentation project operations.

Unit Costs

A net present value analysis was performed on the capital and O&M costs presented above. Based on this analysis, the unit cost of a reservoir augmentation project as San Vicente Reservoir would be approximately $2,000/AF, as shown in Table F-5. Key assumptions of this analysis included:

- The project life is 50 years.
- Financing would be received through rates, revenue bonds, and State Revolving Funds.
- The Water Authority's Local Resource Program (LRP) credits would continue. The uncertain future of these credits was addressed by applying a credit that reflects a midpoint between favorable and unfavorable conditions. Under favorable conditions, the credit is expected to be $450/AF of water produced, while under unfavorable conditions it is expected to be $100/AF. The average of $275/AF was used in estimating the overall cost of reservoir augmentation.
- Grant funding in the amount of 20 percent of capital costs would be received. Such grants are typical for water recycling projects.

Table F - 5: Projected Unit Costs

Project Component	Projected Unit Cost[1]
AWP Facility	$1200/AF
Purified Water Pipeline System	$700/AF
Source Control	$50/AF
Public Outreach	$50/AF
Total	$2,000/AF

1. Assumes a project life of 50 years, financing through both revenue bonds and State Revolving Funds, LRP credits of $275 / AF, and grant funding in the amount of 20% of capital costs.

The projected unit cost of $2,000/AF is consistent with projections developed for the Indirect Potable Reuse - Phase I project evaluated in development of the 2012 LRWRP, which was estimated to cost approximately $2,100/AF, including initial capital and annual operating costs (including energy). A key difference between the costs developed for the LRWRP and the costs presented in this Project Report is that the LRWRP costs do not reflect any potential grant funding or low-interest loans. Neither the costs developed for this study nor the LRWRP costs reflect any cost savings from reduced wastewater treatment and disposal (see Avoided Wastewater Costs section, below).

Household Water Bill

The anticipated effect of a reservoir augmentation project at San Vicente Reservoir on an average monthly household water bill was also calculated. Assuming an average residential usage volume of 14 hundred cubic feet per month, an average untreated water supply cost to the City of approximately $962/AF, and an average total water use of approximately 194,000 AFY, a reservoir augmentation project at San Vicente Reservoir with an average flow of 15 mgd and a unit cost of $2,000/AF would result in an increase of approximately $6.87 per month on an average residential water bill. For comparison, the average residential water bill (fiscal year 2012-2013) was approximately $72.03 per monthly billing cycle (water charges only).

This projected increase does not take into consideration projected increases in monthly water bills expected as the result of increasing imported water supply costs that would occur with or without a reservoir augmentation project at San Vicente Reservoir. It should also be recognized that such a project would provide value to the customer in increased supply reliability and reduced reliance on imported water.

Avoided Costs

The implementation of a reservoir augmentation project at San Vicente Reservoir would result in avoided wastewater system costs, as well as savings related to reduced salinity in the City's water supplies. Avoided wastewater system costs result from the elimination of costly capital improvement needs and in reduced operations and maintenance costs. In order to determine what capital improvements could be avoided as a result of implementing full-scale reservoir augmentation, the

September 2011 Metro Wastewater Plan (Plan) was referenced. The facility requirements described in the Plan correspond to Point Loma remaining a chemically-enhanced primary treatment plant. There are several projects included in the Plan's long-term capital program. Among these projects is the construction of a seven-million-gallon wet weather storage facility that would be needed to attenuate flows to Point Loma. In the absence of full-scale reservoir augmentation, this facility would need to be operational by the year 2022. Its estimated capital and operating costs are $123 million and $6.2 million per year, respectively.

Implementation of a reservoir augmentation project at San Vicente Reservoir would also reduce the flows conveyed to and treated at Point Loma. Annual operations and maintenance savings related to reduced treatment and conveyance, respectively, are approximately $2.2 million and $450,000 per year.

The TDS (a measure of salt content) of purified water produced at the AWP Facility was approximately 15 mg/L. This is in contrast to imported water TDS, which is approximately 500 mg/L and has occasionally exceeded 600 mg/L (City of San Diego, 2012a, City of San Diego, 2012g). The estimated monetary savings to a drinking water system due to reduced salinity was evaluated by MWD and the Bureau of Reclamation in the late 1990s. They found that reduced salinity correlates with longer useful lives of downstream treatment facilities. Savings related to the extended lives of retail customers' plumbing fixtures would also be expected. The savings associated with reduced salinity were further evaluated in Water Reuse Study (City of San Diego, March 2006) specifically for the City's setting and determined to equal $250/AF. The Recycled Water Study (City of San Diego, July 2012) re-evaluated the savings and conservatively applied $100/AF in its financial analysis. While it is anticipated that salt reduction benefits would be observed as a result of a reservoir augmentation project at San Vicente Reservoir, this benefit has not been analyzed as part of the Demonstration Project, and has not been monetized.

These avoided costs, summarized in Table F-6, yield an associated net unit cost of $1,000/AF.

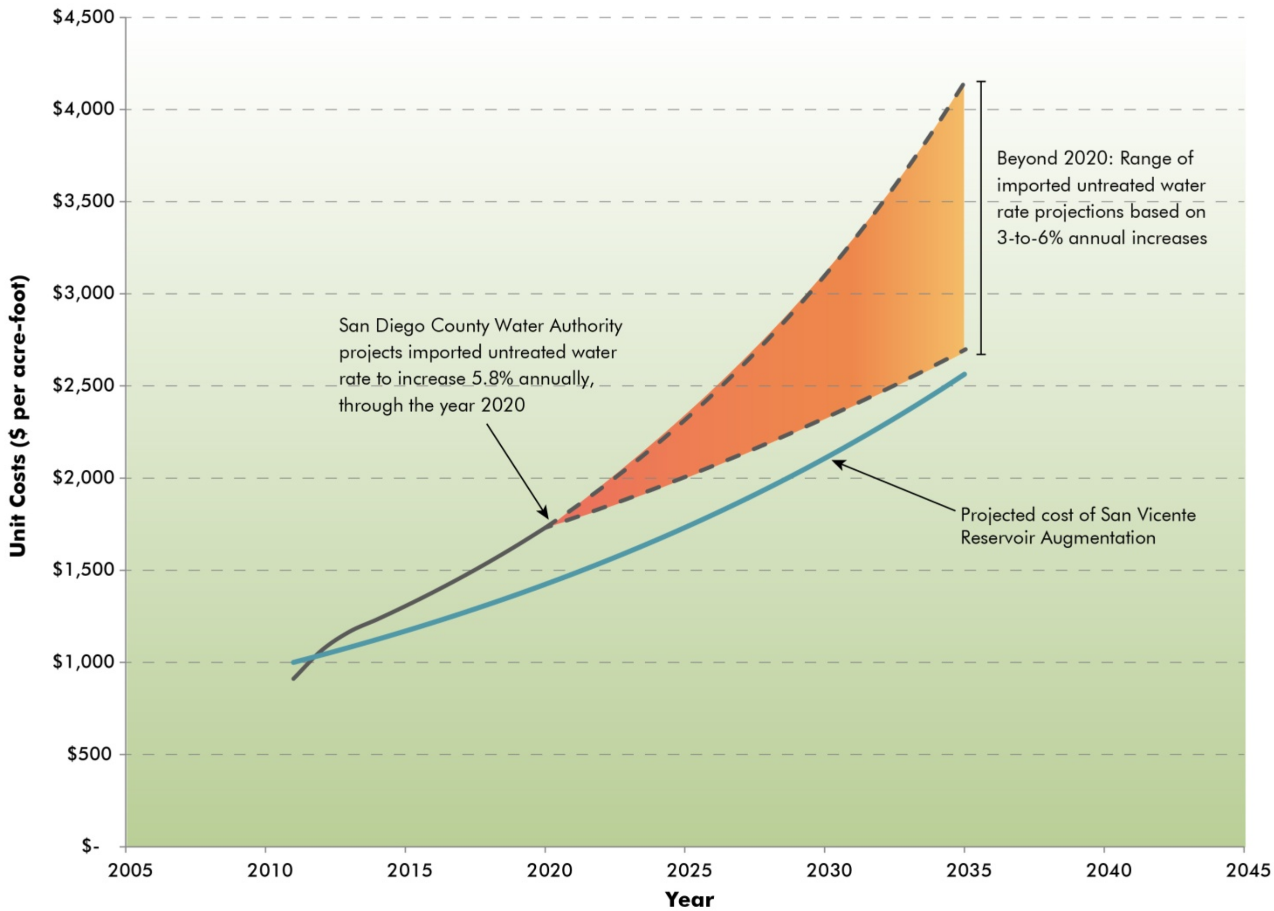
Table F - 6: Avoided System Costs

Benefit	Avoided Cost	Avoided Cost per AF
Point Loma Wet Weather Storage Facility	$123,000,000 (Capital) $6,150,000 (Annual O&M)	$1,000
Reduced Treatment at Point Loma	$2,200,000 (Annual O&M)	
Reduced Pumping at Pump Stations No. 2	$450,000 (Annual O&M)	
Reduced Salinity in Water Supplies		Not monetized
Total Avoided Costs/Savings		$1,000

The current cost of untreated imported water as of January 2013 is $1,039/AF. Imported water costs are expected to increase at a rate of 5.8 percent per year through 2020, and between three and six percent per year after 2020. Figure F-5 presents the current and projected cost of imported water compared to the net cost of water from a reservoir augmentation project at San Vicente Reservoir.

As shown in this figure, the unit cost of imported water supplies exceeds the net unit cost of supplies from a reservoir augmentation project at San Vicente Reservoir.

Figure F - 5: Current and Projected Cost of Water Supplies



For additional cost information, please refer to Section 8.4 of the City of San Diego Recycled Water Study (City of San Diego, 2012b), provided in Appendix G.

Energy

An energy analysis requested by City Council for water supply options will be completed by the consultant preparing the City's 2012 LRWRP. The report is anticipated to be submitted for City Council review and acceptance in early 2013.

Because no single water supply option can meet all goals of the 2012 LRWRP, a range of options (including conservation, groundwater, non-potable reuse, reservoir augmentation, rainwater, gray water, ocean desalination, and imported water) was considered to form eight portfolios and diversify the approach to meet the objective of the plan. Over 20 performance measures were used to comprehensively evaluate each portfolio, which were ranked in terms of their cumulative performance.

Based on these rankings, and their climate change adaptation benefits, three portfolios consistently ranked highest. All three of these highest ranked portfolios included reservoir augmentation at San Vicente Reservoir as a common resource option. The inclusion of a full-scale (15-mgd average flow) reservoir augmentation project as a resource option in all three of the highest ranked portfolios is significant because, if approved by the public, City Council and CDPH, reservoir augmentation at San Vicente Reservoir would be validated based on cost, energy footprint, and other criteria as a recommended near term resource strategy.

One quantitative performance measure for "energy footprint" of the City's water sources is the cumulative carbon dioxide emissions. Energy use can be illustrated by kWh /AF or tons of carbon dioxide emissions per AF. Reporting of greenhouse gas emissions (of which carbon dioxide is considered the largest, or primary component) by major source is required by the California Global Warming Solutions Act (AB 32, 2006). The City's reliance on imported water that originates hundreds of miles away and requires energy-intensive pumping contributes significantly to greenhouse gas emissions.

Greenhouse gas emissions are calculated based on typical per unit energy requirements for each source of water supply, including energy requirements for distribution and wastewater treatment if applicable. The energy (kWh/AF) of each water supply option in the 2012 LRWRP was converted to carbon dioxide equivalents (San Diego, 2012c). Carbon dioxide emissions are a reflection of the energy required to produce water, not the type of energy used, for each water resource. While imported water sources have different sources of energy than local water resources, it is assumed that all water resources use the same energy resource for simplicity.

The 15-mgd reservoir augmentation project at San Vicente Reservoir (estimated to require 2,500 kWh of energy per AF) would produce approximately 1.0 metric tons of greenhouse gases/AF. By comparison, imported water requires a range of 2,000 kWh/AF to 3,300 kWh/AF of energy, depending on the blend of water from the Colorado River or the Bay-Delta in Northern California, respectively. This corresponds to a range of 0.8 to 1.3 metric tons of greenhouse gases/AF (City of San Diego, 2012c). Since 2003, the blend delivered to the Water Authority has averaged approximately two-thirds Colorado River and one-third water from the Bay-Delta. Future imported water energy consumption will vary depending on actual blend. However, for practical purposes, the reservoir augmentation project at San Vicente Reservoir energy consumption is equivalent to that of imported water.

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Section G: Summary and Conclusions

In an average year, approximately 85 to 90 percent of the City of San Diego's water supplies are imported water (City of San Diego, 2011a). Imported water reliability issues, coupled with recurring droughts in the San Diego region, have placed considerable strain on the City's ability to meet water demands. The City has taken a variety of actions to maximize water resources and improve water supply reliability, including moving forward with a three-phased Water Reuse Program designed to maximize the use of recycled water throughout the City. The Water Reuse Program is an integral component of the City's plan to improve water supply reliability by developing local, drought-tolerant water supplies.

The City's 2006 Water Reuse Study (Phase 1 of the Water Reuse Program) included a comprehensive evaluation of all viable options to maximize the use of recycled water produced by the City's two water reclamation plants. Based on this study, a stakeholder group determined that the preferred option for maximizing use of the City's recycled water supply would be to augment existing supplies in the City's San Vicente Reservoir with purified water (reservoir augmentation at San Vicente Reservoir).

The City recently completed Phase 2 of the Water Reuse Program, the Water Purification Demonstration Project. This three-year project assessed the feasibility of supplementing San Diego's San Vicente Reservoir with purified water produced at an advanced water purification facility located at North City. The Demonstration Project involved constructing and operating a small-scale advanced water purification facility, studying San Vicente Reservoir, implementing a public outreach and education program, coordinating with regulatory agencies, and developing conceptual design criteria and costs for a full-scale AWP facility and purified water conveyance facilities. The concept of using purified water to augment San Vicente Reservoir has been determined to be feasible, and the Mayor and City Council may consider implementing a full-scale reservoir augmentation project at San Vicente Reservoir, which would be Phase 3 of the Water Reuse Program.

The Demonstration Project consisted of the following components:

1. Convene an Independent Advisory Panel
2. Design, install, and operate a demonstration-scale advanced water purification facility at the North City Water Reclamation Plant
3. Conduct a study of San Vicente Reservoir to establish residence time and water quality parameters and conditions of purified water in the reservoir
4. Perform an energy and economic analysis

5. Define the state's regulatory requirements for a full-scale reservoir augmentation project at San Vicente Reservoir
6. Perform a pipeline alignment study
7. Conduct a public outreach and education program

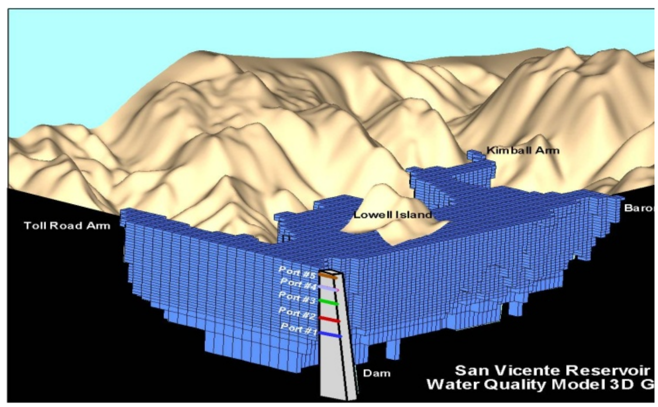
The Demonstration Project generated a significant body of data related to the expected performance of a full-scale reservoir augmentation project at San Vicente Reservoir. Each Demonstration Project component was designed to generate evidence and findings to assess the feasibility of such a project. Each of these components is summarized below.

- ***Component: Convene an Independent Advisory Panel.*** An IAP organized and managed by NWRI was convened in 2009 to oversee the Demonstration Project. The IAP consisted of ten academics and professionals with extensive expertise in the science of water reuse, including water and wastewater technology, public health, epidemiology, toxicology, water quality, environmental science, limnology, public utilities, and industry regulations. The IAP unanimously concluded that the project will "…be a landmark development in the acceptance and furtherance of indirect potable reuse and will contribute to the City of San Diego's water portfolio. The proposed project will supplement existing sources and provide a greater degree of independence, thus improving the reliability of the existing water supply." The IAP findings can be found in Appendix F.
- ***Component: Design, construct, and operate a demonstration-scale advanced water purification facility at the North City Water Reclamation Plant.*** The AWP Facility was designed, installed, operated, and tested between 2010 and 2012. The ability to produce purified water meeting all regulatory standards was evaluated by performing water quality testing on 12 months of purified water samples produced by the AWP Facility. The AWP Facility produced purified water that reliably met applicable water quality standards, and on-line monitoring confirmed the continuous acceptable performance of water purification technologies. Although the testing period is complete, the AWP Facility has continued to operate for public tours and to gather additional equipment performance data.
- ***Component: Conduct a study of San Vicente Reservoir to establish residence time and water quality effects of purified water in the reservoir.*** A detailed study of San Vicente Reservoir was conducted to establish residence time and water quality effects of purified water in the reservoir. Blending, retention time, and water quality in the reservoir were evaluated by using a robust computer model. The model was set up and applied by an expert team and validated by the IAP. It was

Water quality monitoring showed that purified water met all applicable regulatory standards.

determined that blending and retention of purified water in San Vicente Reservoir would constitute a substantial environmental barrier, sufficient to meet regulatory requirements, and that the addition of purified water would not adversely affect natural reservoir conditions and mixing. The modeling showed that the enlargement of the reservoir will improve nutrient-related water quality issues compared to the historical reservoir, and that adding purified to the enlarged reservoir will not substantially affect these improvements.

- ***Component: Perform an energy and economic analysis.*** Costs were developed based on concept-level facility plans prepared as part of the Demonstration Project and validated based on existing operating projects. Full-scale project implementation costs were estimated to be $2,000/AF, with net costs reduced to approximately $1,000/AF when considering wastewater system avoided costs. A full-scale reservoir augmentation project at San Vicente Reservoir would require approximately the same amount of energy and generate green house gas emissions comparable to imported water, based on an energy analysis conducted as part of the LRWRP.
- ***Component: Define the state's regulatory requirements for a full-scale reservoir augmentation project at San Vicente Reservoir.*** Regulators participated in all IAP meetings and working groups addressing all technical aspects of reservoir augmentation conducted throughout the Demonstration Project. This technical background enabled the regulators to establish specific guidelines and regulatory pathways to permitting a reservoir augmentation project at San Vicente Reservoir. A Concept Approval Letter was issued for the project by CDPH, and the Regional Board issued a Resolution of Support for the reservoir augmentation at San Vicente Reservoir, and a Letter of Concurrence confirming the preferred pathway to permit a full-scale project.



The three-dimensional Water Quality Model Output demonstrated that the addition of purified water would improve nutrient-related water quality issues in San Vicente Reservoir.

- ***Component: Perform a pipeline alignment study.*** In 2012, a conceptual design study was completed to update recommendations for the purified water conveyance system, including potential pipeline alignments and pump station specifications (RMC, 2012). The new conveyance study also comprehensively analyzed conditions that have changed since the Water Repurification Project was completed.
- ***Component: Conduct a public outreach and education program.*** Comprehensive City-wide outreach enabled key stakeholders and interested members of the public to gain an understanding of how purified water offers a technically feasible and reliable supplemental water supply. Recent survey research showed that when provided with information about

the water purification process, respondents strongly or somewhat favor adding recycled water to the local drinking water supply. Feedback from individuals that toured the AWP Facility showed that providing an opportunity to tour the facility increases understanding about water purification.

Overall, the AWP Project achieved its stated objectives, and demonstrated that water purification technology may be feasibly used to produce water that could be sent to San Vicente Reservoir to be available to drinking water treatment plants for distribution as drinking water.

Table G-1 provides the summaries and findings generated throughout the course of the Demonstration Project.

Targeted presentations proved to be a vital component of the outreach program, increasing the public's understanding about water purification and the Demonstration Project.

Table G - 1: Demonstration Project Findings and Conclusions

Component	Summary	Findings
Convene an Independent Advisory Panel	The IAP provided expert peer review of the technical, scientific, and regulatory aspects of the Demonstration Project. The IAP met ten times over the course of the Demonstration Project.	The IAP found that purified water would meet or exceed all drinking water requirements and provide multiple barriers for public health protection; reservoir modeling verified that the reservoir will provide 100-fold dilution of purified water, CDPH and the Regional Board have indicated support for the project, and City staff has implemented an effective public outreach program. The IAP found the AWP Facility produced water of a higher quality than any source available to the City of San Diego and unanimously concluded that a reservoir augmentation project at San Vicente Reservoir would be a landmark project in the acceptance and furtherance of indirect potable reuse and would improve the reliability of the City of San Diego's water supply portfolio. See IAP reference letter in Appendix F.
Design, install, and operate a demonstration-scale advanced water purification facility at the North City Water Reclamation Plant	The Demonstration AWP Facility has been in operation since June, 2011. The 12-month testing period took place from August 2011 to July 2012. Comprehensive water quality testing included measurements for 342 constituents and parameters before and after each treatment step, and in the imported aqueduct water. A total of more than 9,000 water quality tests were performed.	Water quality of the purified water was compared to regulatory limits, verifying that purified water met all applicable water quality standards. This comprehensive water quality testing showed that the purified water produced at the AWP Facility is pure, approaching distilled water purity. Continuous and daily monitoring of each water purification process can assure the integrity of each treatment step and that only high quality water is produced.

Component	Summary	Findings
Perform a study of San Vicente Reservoir to establish residence time and water quality parameters and conditions of purified water in the reservoir	A detailed Limnology and Reservoir Detention Study of San Vicente Reservoir was conducted to establish residence time and water quality effects of purified water in the reservoir. Blending, retention time, and water quality in the reservoir were evaluated by using a three-dimensional hydrodynamic model.	The addition of purified water into San Vicente Reservoir would not affect natural hydrologic characteristics of the reservoir, seasonal stratification, or mixing. Blending and retention of purified water in the reservoir would constitute a substantial environmental barrier, sufficient to meet regulatory requirements. For all anticipated reservoir operating scenarios and purified water release locations, the reservoir would dilute the purified water by at least a factor of 200 to one. The addition of purified water would not substantially affect water quality in San Vicente Reservoir. The dam raise will improve overall water quality and the addition of purified water will not change these improvements.
Perform an energy and economic analysis	Cost were evaluated for a full-scale reservoir augmentation project at San Vicente Reservoir in terms of overall capital and operational and maintenance costs; unit costs, which reflect the capital and O&M costs spread over the project life and presented in terms of cost per AF of water produced.	The estimated capital and annual operational and maintenance costs for a full-scale reservoir augmentation project at San Vicente Reservoir are $369 million and $15.5 million per year, respectively. This capital and annual costs for a full-scale project yielded an estimated unit cost of $2,000/AF. This unit cost is comparable to the $2,100/AF unit cost estimated in the LRWRP for a full-scale (15 mgd average production) reservoir augmentation project at San Vicente Reservoir.

Component	Summary	Findings
Perform energy and economic analysis, cont'd	As part of the 2012 Long-Range Water Resources Plan, an energy analysis for a reservoir augmentation project at San Vicente Reservoir was performed.	Accounting for wastewater system avoided costs, the estimated net unit cost of a reservoir augmentation project at San Vicente Reservoir is $1,000/AF, which is comparable to the current imported water cost. A full-scale reservoir augmentation project at San Vicente Reservoir was estimated to require 2,500 kWh/AF of energy and would produce approximately 1.0 metric tons of greenhouse gases/AF. A full-scale project would consume energy and produce green house gas emissions that are equivalent to imported water and less than ocean desalination.
Define the state's regulatory requirements for a full-scale reservoir augmentation project at San Vicente Reservoir	Throughout the Demonstration Project the City engaged separately with the California Department of Public Health and the San Diego Regional Water Quality Control Board. In addition, both agencies actively participated in ten IAP meetings.	The California Department of Public Health issued a concept approval of the City's San Vicente Reservoir Augmentation Project. The San Diego Regional Water Quality Control Board, with concurrence from the United States Environmental Protection Agency issued concept approval as well.
Perform a pipeline alignment study	A conceptual design study was completed to update recommendations for the purified water conveyance system, including potential pipeline alignments and pump station specifications.	The estimated capital and annual operational and maintenance costs for the conveyance system are $225 million and $3.4 million, respectively. Updated analysis of the pipeline alignment confirmed that a southerly alignment appears to be the most feasible.

Component	Summary	Findings
Conduct a public outreach and education program	A comprehensive public outreach and education program was conducted throughout the city to educate San Diego's local leaders, stakeholders and residents about the Demonstration Project	Recent research showed that when provided with information about the water purification process, respondents favor use of purified water to supplement local water supply via reservoir augmentation at San Vicente Reservoir. Feedback from individuals that toured the Advanced Water Purification Facility showed that providing an opportunity to tour the facility increases understanding about water purification.

Section H: Project Report Approval

The Water Purification Demonstration Project Final Report was completed in March 2013. The 129 page report with multiple appendices was made available to the public online and on compact disc. For those without access to the internet, a printed copy was made available for review by appointment in city offices.

The Final Report was presented to the Natural Resources and Culture (NR&C) Committee on March 20, 2013. The audience included a number of supporters including members of the Independent Advisory Panel and the Water Reliability Coalition. Representatives from both organizations provided comments to the four-person committee. No opposition was present.

A motion was made to accept the Final Report with the following steps outlined in the Water Reliability Coalition's recommendations:

- Accept the Water Purification Demonstration Project final project report;
- Direct staff to return with a preferred plan for a full-scale project that maximizes water supply and potentially reduces the need for upgrades at Point Loma Wastewater Treatment Plant, with an aggressive schedule for implementation;
- Determine local resource funding policy (as described on page 16 of staff report);
- Determine contracting mode;
- Develop a financing plan;
- Monitor development of direct potable reuse regulations; and
- Report back on the progress of each the above items within 90 days of City Council hearing.

Direct staff to bring forward to the City Council preferred plans for both indirect potable reuse and direct potable reuse systems.

The Committee voted unanimously to move the item to full Council for their consideration.

The NR&C Committee received written comments from a citizen regarding the San Vicente Reservoir Study. The Public Utilities Department provided a written response to these comments and the item is considered closed.

Following the NR&C meeting, a series of "results driven" presentations on the Demonstration Project were given to various organizations, including:

- Conservation Action Committee — April 8, 2013
- Independent Rates Oversight Committee — April 15, 2013
- Building Owners & Managers Association — April 15, 2013
- County Water Authority Member Agency Managers' Meeting — April 16, 2013

The Final Report was presented at the April 23, 2013, City Council meeting. Stakeholders representing the Water Reliability Coalition and the Independent Advisory Panel spoke in favor of the report.

The Final Report was well received by Council and a motion was made by Councilmember Alvarez and seconded by Councilmember Faulconer to adopt staff's recommendation with direction to join the Direct Potable Reuse Initiative. Council unanimously voted to adopt the Water Purification Demonstration Project Report (Resolution R-308121) as a fulfillment of the Demonstration Project elements outlined in Resolutions R-303095 and R-304434 (Appendix I).

Project outreach continues throughout the city with presentations focused on Demonstration Project results.

References

Supporting Documents Referenced in this Report

In addition to this Project Report, many technical studies, testing reports, and outreach documents were produced as part of the Demonstration Project. Those documents, which were used as the basis for the Project Report, are listed below for reference. The public may schedule an appointment with the Public Utilities Department for viewing of these documents as well as other project related documents that are not posted on the project website. Due to the size of these documents, the distribution was limited.

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The project team consisted of City staff from the Public Utilities Department, and a consulting team from RMC Water and Environment, CDM Smith, Montgomery Watson (MWH), Richard Brady and Associates, Katz and Associates, Flow Science Incorporated, Michael Welch, and DDB Engineering.

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APPENDICES

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Appendix A: Proposal to CDPH to Augment San Vicente Reservoir with Purified Recycled Water

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THE CITY OF SAN DIEGO

City of San Diego
Water Purification Demonstration Project

Proposal to Augment San Vicente Reservoir with Purified Recycled Water

March 22, 2012

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Water Purification | Demonstration Project

Table of Contents

This proposal was prepared by the Water Purification Demonstration Project team, which consists of City staff, plus staff of RMC Water and Environment and its sub-consultants.

This proposal was reviewed by members of the project's Independent Advisory Panel.

The City of San Diego thanks the California Department of Public Health for its participation and input over the past two years regarding the City's Water Purification Demonstration Project. This participation and input has been invaluable as the City's project team structured the proposed project and this proposal.

List of Acronyms

AFY	Acre-Feet per Year
AOP	Advanced Oxidation Processes
AWPF	Advanced Water Purification Facility
CCP	Critical Control Point
CCR	California Code of Regulations
CDPH	California Department of Public Health
CEC	Chemicals of Emerging Concern
CTR	California Toxics Rule
EPA	Environmental Protection Agency
GWRS	Ground Water Replenishment System
IAP	Independent Advisory Panel
IPR/RA	Indirect Potable Reuse / Reservoir Augmentation
MCL	Maximum Contaminant Level
MF	Microfiltration
µg/L	micrograms per liter (equivalent to parts per billion)
mg/L	milligrams per liter (equivalent to parts per million)
mgd	million gallons per day
NCWRP	North City Water Reclamation Plant
NDMA	N-Nitrosodimethylamine
ng/L	Nanograms per liter (equivalent to parts per trillion)
NPDES	National Pollutant Discharge Elimination System
NWRI	National Water Research Institute
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
PLWTP	Point Loma Wastewater Treatment Plant
RO	Reverse Osmosis
SWRCB	State Water Resources Control Board
TOC	Total Organic Carbon
UF	Ultrafiltration
UV	Ultraviolet
WPDP	Water Purification Demonstration Project

Section 1 Introduction

The purpose of this proposal is to obtain concept approval from the California Department of Public Health for the City of San Diego's Indirect Potable Reuse / Reservoir Augmentation Project at San Vicente Reservoir. The project would supplement the roughly 240,000 acre-foot San Vicente Reservoir with up to 15,000 acre-feet per year of purified recycled water produced at the City's North City Water Reclamation Plant. The City understands that California Department of Public Health's concept approval would be specific to the proposed project at San Vicente Reservoir.

In 2007, the San Diego City Council called for a demonstration project that would assess the feasibility of full-scale Indirect Potable Reuse / Reservoir Augmentation. Under direction of the Mayor, the City's Public Utilities Department implemented the Water Purification Demonstration Project to achieve this objective.

The key regulatory authority to approve an Indirect Potable Reuse / Reservoir Augmentation (IPR/RA) project lies with the California Department of Public Health. A final decision by the City to implement a full-scale project will depend, in part, on obtaining concept approval from CDPH.

California Department of Public Health (CDPH) does not yet have formal regulations for IPR/RA. Therefore, this proposal consists of two elements. First, in Sections 1 through 6 the proposal presents the project and its regulatory setting, and the results and conclusions reached in the Water Purification Demonstration Project (WPDP). Second, in Section 7 this proposal presents a suggested regulatory framework of the City's IPR/RA project.

This proposal is organized into seven sections.

Section 1: Introduction

Section 2: Current Activities Supporting Implementation of the Project

Section 3: Need for the Project

Section 4: Regulatory Setting

Section 5: Components of the Full-Scale IPR/RA Project

Section 6: Public Health Protections Provided by the Full-Scale IPR/RA Project

Section 7: Elements of the Suggested Regulatory Framework

Section 2 Current Activities Supporting Implementation of the Project

Scientific research and engineering analyses have been conducted over the last two years as part of the City's WPDP, a phase of work designed to substantiate regulatory and economic feasibility and assess public acceptability of the full-scale project. The project includes the construction and operation of a 1 mgd advanced water purification demonstration facility (herein referred to as the demonstration facility) that uses the same feed water as will be used for a full-scale advanced water purification facility (AWPF). Detailed studies of the demonstration facility's performance are being conducted over the course of one-year of operation, including four quarterly reports on water quality.

To date, three elements of the Water Purification Demonstration Project (WPDP) that are applicable to this concept proposal have been completed.

An assessment of the City's existing wastewater source control program, resulting in a review of City's industrial pretreatment requirements and identification of potential additional source control features to support an IPR/RA project.

Operation of the water purification demonstration facility built as part of the WPDP, which includes full-scale components of micro-filtration or ultra-filtration, reverse osmosis, and ultraviolet disinfection and advanced oxidation; plus testing and monitoring of the demonstration facility yielding first and second quarter reports.

The San Vicente Reservoir Hydrodynamic Study, including development of a 3-dimensional model to assess the reservoir's hydrodynamic responses.

2.1. Independent Advisory Panel

In addition to the above work elements, the National Water Research Institute (NWRI) has convened a ten-member Independent Advisory Panel (IAP) to support the City and regulators in assessing the results of the WPDP and the viability of a full-scale project. Through IAP meetings and project working group meetings, IAP members have been updated on the findings of the WPDP work elements. Feedback received from subsequent review meetings with the IAP has been incorporated into major project documents.

2.2. CDPH Participation

In March 2008, the City met with CDPH to discuss the scope and expectations of the WPDP. Based in part on CDPH input, a 1 mgd demonstration facility was constructed and the studies of San Vicente Reservoir were initiated. A cornerstone of the City's efforts has been keeping CDPH actively engaged throughout the project. California Department of Public Health staff members have been encouraged to attend IAP meetings and have been active participants in project working group meetings. Through these meetings, CDPH has reviewed reservoir technical studies and demonstration facility testing results that support the findings presented in this proposal.

2.3. Public Outreach

A comprehensive public outreach program is essential to moving past negative public perceptions associated with using purified recycled water for potable purposes. To move the public beyond these perceptions, a communication plan was prepared that outlines activities to encourage involvement among community leaders, stakeholders, and residents. Activities include a speakers bureau, developing written materials for English-speaking and non-English speaking audiences, stakeholder interviews, brochures, research surveys, videos, electronic updates, and a website. Tours of the demonstration facility are also available for an up-close experience of the treatment process. To date, more than 1,850 people have attended more than 145 tours.

Outreach efforts have garnered positive coverage both locally and nationally. On January 23, 2011, the San Diego Union-Tribune published an editorial in which the editorial board wrote that it had come to accept the science behind water purification technology and encouraged the rest of San Diego to do the same. Soon after this editorial there was a front page cover story in USA Today (March 3, 2011) and, most notably, an article on the cover page of the New York Times (February 10, 2012).

As a result of this extensive outreach effort, public opinion polls show that strong opposition to indirect potable reuse dropped from 45 percent in 2004 to 12 percent in 2009 to 11 percent in 2011 [San Diego County Water Authority, 2011). The 2011 survey also found that 65 percent of respondents either strongly favored or somewhat favored advanced treated recycled water (referred to as purified water in the City's project) as an addition to the region's supply of drinking water – a dramatic increase over the results of the 2004 survey where only 26 percent of respondents indicated a favorable rating.

Section 3 Need for the Project

Even with aggressive conservation efforts, the City estimates it will need approximately 35 percent more water in 2030 than was required in 2010 (City of San Diego, 2010). For years, the City has attempted to diversify and enhance its existing water supply. The City's 2002 Long-Range Water Resources Plan (City of San Diego, 2002) identifies the need for the City to develop additional local water supply sources as a means of providing reliability and protection from water supply shortages.

In 2004, the San Diego City Council directed the City Manager to conduct a study to evaluate options for increasing the beneficial use of the City's recycled water. The Water Reuse Study (City of San Diego, 2006) found that the strategy of augmenting a local reservoir with purified water both "maximizes the use of the available recycled water supply" and provides the "lowest overall unit cost" of the reuse strategies that were evaluated. In October 2007, the San Diego City Council accepted the Water Reuse Study and recognized the North City-3 strategy, also known as San Vicente Indirect Potable Reuse, as their preferred alternative.

Reservoir augmentation using San Vicente Reservoir would enable the City to maximize available, but unused, recycled water produced at the NCWRP. Currently an average of 7,500 AFY of the recycled water produced at NCWRP is used for irrigation and industrial purposes; the remaining water produced at NCWRP is discharged to the ocean. Recognizing this loss of a valuable resource, the San Diego City Council, in September 2008, approved moving forward with the WPDP. In November 2008, the City Council approved a water rate increase to fund the WPDP.

Section 4 Regulatory Setting

Indirect potable reuse projects via groundwater recharge by surface spreading are generally covered under the California Code of Regulations (CCR), Title 22, Water Recycling Criteria, which enables CDPH to approve such projects on a case-by-case basis. California Department of Public Health has also drafted regulations specific to groundwater replenishment projects using both surface and subsurface applications. Although not adopted, the Draft Groundwater Recharge Regulations (CDPH, 2011; the latest release is dated November 21, 2011) have received substantial review and revision. These draft regulations provide a basis for CDPH to approve groundwater replenishment projects. Six groundwater replenishment projects have been approved over the years by CDPH based through a case-by-case review of each individual project. Currently, there are no existing or draft CDPH regulations that address indirect potable reuse using surface water augmentation.

In 1994, the City, in partnership with the San Diego County Water Authority, initiated a series of technical studies on indirect potable reuse. These included pilot testing of advanced treatment technologies and studies of reservoir hydrodynamics for the purpose of assessing the potential to augment San Vicente Reservoir with purified water from NCWRP (City of San Diego, 1996 and San Diego County Water Authority, 1994). In August 1994, based on a feasibility study submitted by the City, the California Department of Health Services (as CDPH was then called) issued conditional concept approval for that project (California Department of Health Services, 1994). Although deemed technically feasible, work on this "water repurification" project was discontinued in 1999.

Prompted by the City's proposed "water repurification" project, the State of California assembled a blue ribbon panel to assess surface water augmentation. In 1996, the State Water Resources Control Board (SWRCB), in partnership with the California Department of Water Resources and the Department of Health Services, adopted a Framework for Indirect Potable Reuse via Surface Water Augmentation based on the recommendations of this blue ribbon panel (State Water Resources Control Board, 1996).

In 2003, a State Recycled Water Advisory Committee was convened to provide guidance in achieving the State's water recycling goals. One of the findings of the Advisory Committee was that, through a combination of previous research and policy direction (including the 1996 framework document), a sufficient basis was in place to enable the regulatory community to approve surface water augmentation projects. That basis included the then-applicable version of the Draft Groundwater Recharge Regulations.

In 2010, Governor Schwarzenegger signed into law SB 918, which requires CDPH to adopt uniform water recycling criteria for groundwater recharge by December 31, 2013, and for surface water augmentation by December 31, 2016 if a specified expert panel, convened pursuant to the bill, finds that the criteria would adequately protect public health.

Due to the unique project setting and features being proposed by the City, and the City's desire to make a decision on proceeding with a full-scale project by the end of calendar year 2012, CDPH is being formally requested to issue conceptual project approval based on this concept proposal and the scientific research being conducted as part of the City's WPDP.

Based on the State's 1996 framework document, CDPH's 2011 Draft Groundwater Recharge Regulations (specifically relating to subsurface application with full advanced treatment), and input provided by CDPH during the course of the WPDP, the following elements are expected to provide the framework for regulating the City's full-scale IPR/RA project:

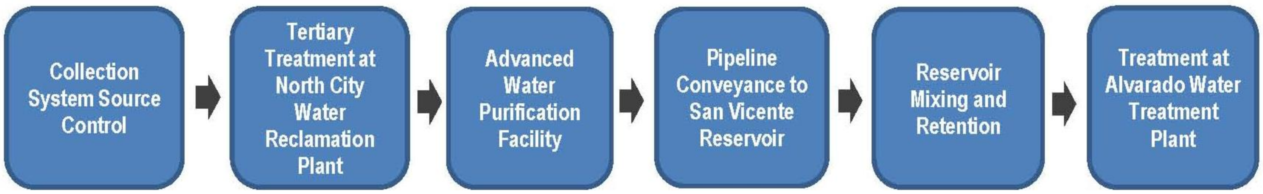
- enhanced wastewater source control
- pathogenic microorganism control
- control of nitrogen compounds
- control of regulated contaminants, monitoring of additional chemicals and contaminants, and control of total organic carbon
- reliability and redundancy
- monitoring and response plan consisting of
    - AWPF integrity monitoring
    - San Vicente Reservoir retention and blending
    - mitigation of an AWPF system failure by San Vicente Reservoir

The following sections describe full-scale project components and address how the City's proposed project will meet the above provisions.

Section 5 Components of the Full-Scale IPR/RA Project

The components of the City's full-scale IPR/RA project are shown in the schematic and described in more detail below.

Components of the Full-Scale IPR/RA Project



5.1. Existing Wastewater Source Control Program

The City maintains a comprehensive industrial pretreatment and source control program approved by the U.S. Environmental Protection Agency for control of waste discharges from industrial sources into the wastewater collection system. The City is responsible for water quality sampling and monitoring the entire wastewater system through treated effluent to fulfill the requirements of its National Pollutant Discharge Elimination System (NPDES) permits issued by the San Diego Regional Water Quality Control Board. The main components of the industrial pretreatment and source control program are

- grant and manage industrial user permits;
- establish sampling, analysis, reporting, record keeping, and notification requirements;
- perform inspections and monitor discharges; and
- enforce limits and authorize penalties for discharge violations.

The program organizes all industrial users into 27 sewersheds throughout the City, four of which cumulatively correspond to the area upstream of NCWRP. Because the full-scale AWPF will be located at NCWRP, these already-established sewersheds will ease the implementation of any enhanced source control practices that may apply specifically to industrial dischargers upstream of the full-scale project. At present there are 198 industries with industrial user permits in the NCWRP drainage area, 102 of which are research and development companies. The remaining 96 industries cover 49 different industry types including car washes, gas stations, electronic equipment manufacturers, and veterinary services.

5.2. North City Water Reclamation Plant

The NCWRP is a 30-mgd water reclamation plant serving roughly 7,500 AFY of recycled water to irrigation and industrial customers throughout the North City area. NCWRP operates as a scalping plant, receiving flows that would otherwise be treated at the Point Loma Wastewater Treatment Plant (PLWTP). As such, flows can be diverted at any time from NCWRP and sent to PLWTP. Biosolids are sent offsite for processing, with no return flow to NCWRP.

NCWRP consists of primary sedimentation, secondary aeration with full nitrification and partial denitrification, secondary clarification, deep bed anthracite filtration, and chlorine disinfection. Although chlorine disinfection is provided to meet the requirements specified in the Water Recycling Criteria for the current nonpotable uses of the recycled water, to control formation of trihalomethanes flows supporting the IPR/RA project would be diverted to the AWPF prior to chlorine disinfection.

The facility operates as a scalping plant, with flow equalization facilities mitigating impacts from diurnal flow variations, supporting a stable biological process. All waste streams are sent offsite to PLWTP for disposal.

Aerial of NCWRP

5.3. Advanced Water Purification Facility

The City proposes to build an 18-mgd capacity AWPF meeting the requirements stipulated in the pending draft CDPH groundwater recharge regulations for subsurface application. The demonstration facility, being operated as part of the WPDP, has validated the performance of standard AWPF technologies at full-scale on NCWRP tertiary filter effluent.

The full-scale facility will have the following main process components.

Membrane filtration Tertiary effluent will flow to a low pressure membrane filtration process consisting of either microfiltration (MF) or ultra-filtration (UF). In addition to minimizing reverse osmosis fouling by removing colloidal and suspended particles, low pressure membranes provide a barrier to a wide array of microbes and will assist in meeting the project's microbial removal targets.

Reverse osmosis All AWPF flow will receive reverse osmosis (RO) treatment, the primary barrier to organic chemicals. The RO system will meet the applicable salt rejection specification established by CDPH. Permeate from the RO system will flow to AOP, while concentrated brine from the RO system will be discharged back to the sewer (downstream of the diversion to NCWRP).

Disinfection, photolysis, and advanced oxidation The advanced oxidation (AOP) step, as it is referred to in the City's project, actually serves three purposes. High intensity UV irradiation provides the primary disinfection step in the AWPF. High intensity UV irradiation also provides photolysis of certain classes of organic chemicals such as NDMA. With the addition of hydrogen peroxide, high intensity UV provides an additional barrier to oxidizable contaminants. The AOP process will be designed to adhere to the criteria for advanced oxidation established in the Draft CDPH GWR regulations.

Although the City has tested UV as the primary source of disinfection and advanced oxidation, it is recognized that ozone is also being considered in certain IPR projects. While the City is not proposing to use ozone at this time, it may be considered as this project moves into the facility planning and design phase.

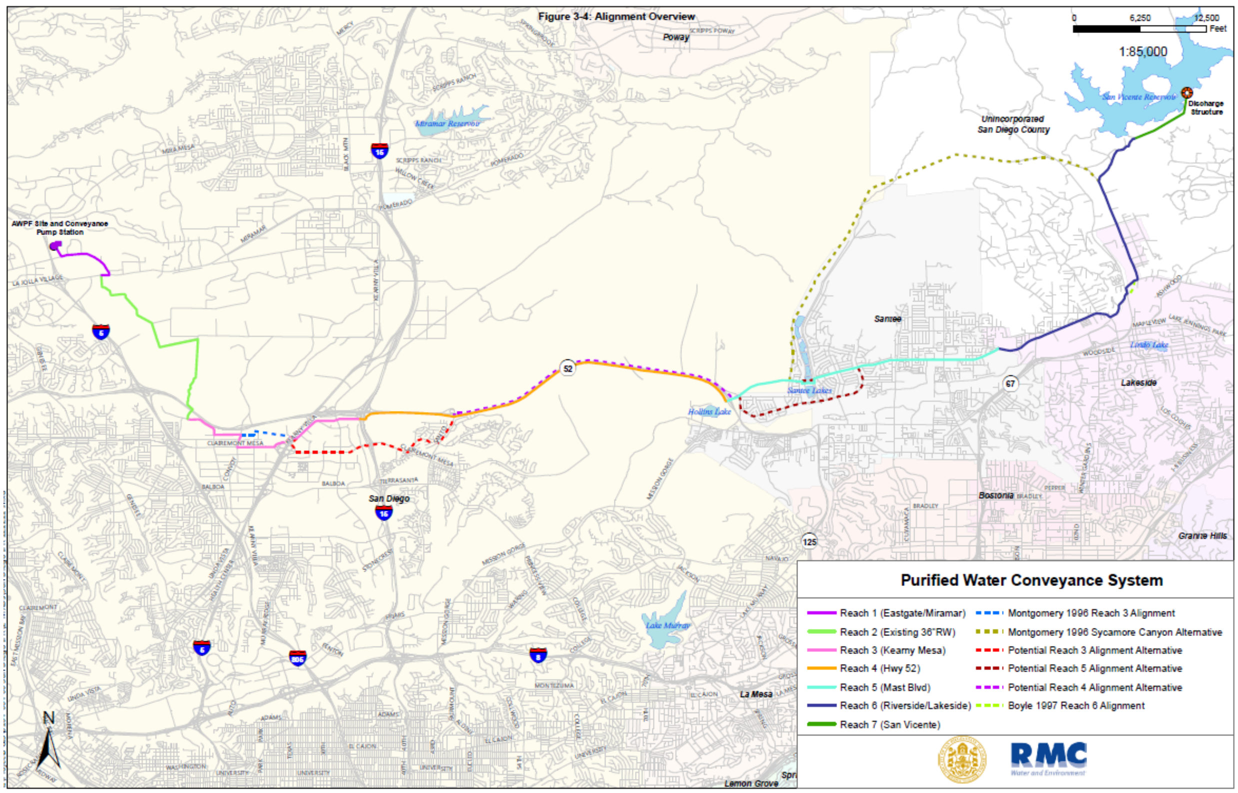
Reverse Osmosis Membranes at the Demonstration Facility

5.4. Purified Water Conveyance to San Vicente Reservoir

Purified recycled water will be pumped through a 23-mile, 36-inch diameter pipeline to San Vicente Reservoir. The static lift from the purified water pump station at the AWPF to San Vicente Reservoir is about 445 feet. A flow control structure at the reservoir outlet and surge control facilities will be required to optimize flow conditions in the pipeline.

The travel time of the purified water from the pumping station to the reservoir discharge structure is approximately 10 hours, based on a maximum pumping rate of 18 mgd. Should there be an operation malfunction at the AWPF, this would allow time to interrupt conveyance before any affected water reaches the reservoir. The pipeline could then be used to hold the affected water while the situation is assessed and resolved based on an approved response plan. The pipeline will be designed so that, if necessary, the entire volume of the pipeline could be drained to a local sanitary sewer via dedicated infrastructure; thus, off-specification water would be sent to the PLWTP.

Potential Alignments of the Conveyance Pipeline



5.5. San Vicente Reservoir

San Vicente Reservoir is located approximately 25 miles northeast of San Diego. The dam was built in 1945. It impounds San Vicente Creek, a tributary of the San Diego River. The dam and reservoir is owned and operated by the City's Public Utilities Department. San Vicente Reservoir impounds local runoff from its 75 square-mile catchment, stores water transferred from Sutherland Reservoir, and stores water imported from the Colorado River and northern California. The reservoir's dominant use is municipal water supply; all other uses of the reservoir are subordinate to water supply. The reservoir also supports limited recreational activities including boating, fishing, and water skiing, although these activities have been suspended during construction of facilities to raise San Vicente Dam. As part of the

San Diego County Water Authority's (SDCWA) Emergency Storage Project, San Vicente Reservoir is being enlarged (i.e., the dam is being raised) from its historical size of 90,000 AF to 247,000 AF. Construction of the expansion is scheduled to be complete by 2013, with refilling expected to take a few years depending on availability of imported water. The City and SDCWA will share storage capacity in the reservoir. The Emergency Storage Project provides local reservoir storage and pipeline connections to serve the region should the imported water supply be disrupted. The enlarged reservoir will be substantially filled prior to initiation of the full-scale IPR/RA project.

With the full-scale IPR/RA project, the City is proposing to augment water stored in San Vicente Reservoir with purified water from the AWPF. The full-scale IPR/RA project will place an annual average of 15,000 AF of purified water into the reservoir. There will be seasonal variation in the inflow of purified water due to non-potable demands at NCWRP, with winter monthly average inflows as high as 18 mgd and summer monthly average inflows as low as 9.5 mgd. The City will have the flexibility to fill San Vicente Reservoir using other water sources, such as local runoff and imported water. After implementation of the full-scale IPR/RA project, the reservoir will continue to store local runoff, imported water, and water transferred from Sutherland Reservoir. Purified water will blend with these other waters and will, in essence, substitute for a similar amount of imported water.

Generally, San Vicente Reservoir provides a substantial retention time for the purified water prior to conveyance to the potable water treatment plant. Based on an average 19,000 AFY reservoir withdrawal and an average reservoir volume of 155,000 AF (based on SDCWA preliminary SVR operations plan), the theoretical average purified water retention time in the reservoir would be on the order of eight years. It should be noted that during the winter months when destratification of the reservoir occurs portions of the purified water inflow will not be retained for this long. During this destratified period, however, the reservoir - and the purified water inflow - undergoes substantial mixing, essentially diluting purified water with the full volume of water in the reservoir. This hydrodynamic effect is further discussed in Section 6.

All operations of San Vicente Reservoir are fully in control of the City. Outflow from the reservoir and inflows to the reservoir (other than runoff) are controlled by the City. There are no releases from the reservoir to the natural stream system downstream. All outflows from the reservoir are pipeline conveyances to the municipal water system. The City has the ability to shut off outflow from the reservoir at any time without disrupting supplies to the municipal system.

San Vicente Reservoir

5.6. Alvarado Water Treatment Plant

Under normal operations water withdrawn from San Vicente Reservoir is conveyed to the City's 200-mgd Alvarado Water Treatment Plant, which serves the central portion of the City. The plant has recently been upgraded to meet federal Safe Drinking Water Act requirements. The Alvarado Water Treatment Plant is a conventional water treatment facility using ozone as a disinfectant. The filtration and disinfection achieves a minimum 3-log *Giardia* cyst reduction and 4-log virus reduction.

The Alvarado Water Treatment Plant has multiple sources of supply. There are direct connections to the SDCWA's First and Second Aqueducts, which carry imported water. The City's El Monte Pipeline carries combined flows from El Capitan Reservoir and San Vicente Reservoir – the plant can receive water from either of these reservoirs or a blend from both reservoirs. Water can be pumped to the plant from Lake Murray, which is immediately adjacent. Each of these sources is at the immediate control of the plant operator, an any of these sources can be shut off without disrupting the Alvarado Water Treatment Plant's capacity or its ability to supply the distribution system. Thus, should San Vicente Reservoir need to be taken offline for any reason, the Alvarado Water Treatment Plant's full demand can be served by the other sources.

Through agreements with SDCWA, a portion of San Vicente Reservoir's storage may be used in emergency and extended drought conditions to supply water treatment plants serving the southern half of San Diego County. In an emergency event, other plants that could be supplied from San Vicente Reservoir are the City's Miramar and Otay Water Treatment Plants, the Helix Water District's Levy Treatment Plant, the Sweetwater Authority's Purdue Water Treatment Plant, and the Santa Fe Irrigation's Districts Badger Water Treatment Plant. Each of these is a full conventional treatment plant achieving virus and *Giardia* reductions comparable to those achieved at the Alvarado Water Treatment Plant.

Alvarado Water Treatment Plant

Section 6 Provision of Public Health Protections by the Full-Scale IPR/RA Project

San Diego's full-scale IPR/RA Project will adhere to the multi-barrier concept that is fundamental to the provision of public health safeguards in IPR projects. The regulatory discussion in Section 5 introduced the elements that are necessary to ensure that public health protections are provided by the full-scale IPR/RA Project, consisting of:

- enhanced wastewater source control
- pathogenic microorganism control
- control of nitrogen compounds
- control of regulated contaminants, monitoring of additional chemicals and contaminants, and control of total organic carbon
- reliability and redundancy
- monitoring and response plan consisting of
  - AWPF integrity monitoring
  - San Vicente Reservoir retention and blending
  - mitigation of an AWPF system failure by San Vicente Reservoir

The following sections describe these provisions in more detail.

6.1. Enhanced Wastewater Source Control

The City's existing wastewater source control program will be expanded to support the IRP/RA project. The City has conducted discussions with Orange County Sanitation District (OCSD) who, as a project co-sponsor with Orange County Water District (OCWD), provides source water for the Ground Water Replenishment System (GWRS). The intent of the discussions was to identify additional applicable source control strategies that would enhance the City's existing program in an IPR setting.

The City's source control program and that of Orange County are similar. Both programs strive to prevent adverse impacts on the treatment facilities and the environment in compliance with state and federal requirements for industrial pretreatment programs. The City recognizes that the OCSD program serves as a model of an expanded source control program that includes contaminants that may be harmful to human health and drinking water supplies in compliance with CDPH goals for IPR projects. As an example, OCSD's enhanced source control program controls NDMA through the following actions.

> Incorporate monitoring requirements for NDMA in industrial permits which have the potential to discharge a significant amount of NDMA. This is known as local limit monitoring.
>
> Establish voluntary BMPs for NDMA discharges.
>
> Monitor for NDMA at low concentrations (at least parts per trillion), and do this monitoring at least quarterly. Both OCSD and OCWD independently monitor the GWRS influent (secondary effluent). The GWRS influent and purified recycled water is monitored by OCWD at low detection levels (parts per trillion) on a weekly basis. Close communication between OCSD and OCWD is maintained, particularly if any unusual NDMA spikes are detected.

In the case that an unusual NDMA spike is detected, OCSD uses its geographic information system database to identify potential dischargers upstream of the sampling site. This ability to identify upstream dischargers improves response time and the overall effectiveness of the program.

The City recognizes the preponderance of pharmaceutical research in the NCWRP sewershed. As such, the enhanced wastewater source control program will include specific strategies for pharmaceutical manufacturers. The City currently prohibits discharges of any pharmaceutical manufacturing products or wastes, including incidental wash water or other pharmaceutical residues, to the sewer. Among the strategies that may be added to expand the wastewater source control program are measures such as requiring pharmaceutical manufacturers to report the pharmaceutically-active ingredients in their products, the volume of product they produce annually, the volume of wastes generated, and the disposed methods for the wastes. The City intends to submit a robust source control program for CDPH's review as part of the formal permitting process.

6.2. Pathogenic Microorganism Control

Pathogen removal is one of the key criteria for IPR projects. The November 21, 2011 draft groundwater recharge regulations require a total of at least 12-log enteric virus, 10-log *Giardia* cyst and 10-log *Cryptosporidium* oocyst reduction from raw sewage to drinking water (i.e., to the potable water distribution system). San Diego's full-scale IPR/RA Project can easily meet these removal goals.

The figure below illustrates the theoretical pathogen log reduction provided by the San Diego IPR/RA project. In addition to the removal that occurs at the AWPF, there are multiple barriers for pathogen removal, including at least 2-log reduction at NCWRP, 2-log reduction at San Vicente Reservoir, and 2-log reduction of *Cryptosporidium* and 4-log reduction of viruses at the surface water treatment plant.

Pathogen Removal in the City's IPR/RA Treatment Process

Organism	Log Reduction Required	Log Reduction Obtained	Secondary/ Tertiary [1,2,3] Treatment	Advanced Water Purification: Membrane [3] Filtration	+ Reverse [4,5] Osmosis	+ UV [6] Disinfection	+ Advanced Oxidation	Surface [7] Water Augmentation	Treatment [8] at Drinking Water Plant
Cryptosporidium	10	**18**	2	4	2	6		2	2
Giardia	10	**19**	2	4	2	6		2	3
Viruses	12	**16**	2	0	2	6		2	4

1 Water Reuse Issues, Technologies, and Applications, Takashi Asano, et al., 2007

2 A Guide to Waterworks Design, Saskatchewan Ministry of Environment, January 2008

3 California Surface Water Treatment Rule Alternative Filtration Technology Summary, CDPH DDWEM Technical Programs Branch, August 2011

4 Study of Wastewater Reclamation Using Backwashable Capillary Ultrafiltration And Encapsulated Reverse Osmosis Membrane Modules, Hydranautics, June 1999

5 Reverse Osmosis and Nanofiltration, American Water Works Association and Robert Bergman, October 2007

6 Demonstration of UV Disinfection and Oxidation - System Performance Validation Report, Orange County Groundwater Replenishment System, July 2004

Australian Guidelines for Water Recycling: Managing Health and Environmental Risks - Augmentation of Drinking Water Supplies, 2008, Table 4.9

7 Water Purification Demonstration Project: Limnology and Reservoir Detention Study of San Vicente Reservoir - Hydrodynamic Modeling Study, Flow Science, Inc., November 22, 2011

8 Long Term 2 Enhanced Surface Water Treatment Rule, USEPA, January 2006

While not necessary, it may be possible for the project to increase its log reduction credits. For example, integrity testing procedures such as the TRASAR testing used to obtain credit for membrane filtration may become available for RO. Also, advanced oxidation provides yet another microbial barrier that is not accounted for in figure above.
Under normal operation, the project benefits from the advanced disinfection technologies provided by the Alvarado Water Treatment Plant. However, it is noted that all the potable water treatment plants that could potentially receive water from San Vicente Reservoir are required to operate with a minimum removal credit of 4 logs for viruses and 2 logs for *Cryptosporidium*. Therefore, during emergency and extreme drought scenarios when San Vicente Reservoir water may be diverted to other surface water treatment plants, the log removal credits will easily be met.

6.3. Control of Nitrogen Compounds

The secondary treatment process at NCWRP fully nitrifies and partially denitrifies. Coupled with RO at the AWPF, purified water is expected to easily meet the CDPH standard for total nitrogen for direct injection IPR projects of 5 mg/L. Based on First and Second Quarter AWPF Monitoring Reports, AWPF product in a full-scale facility would have total nitrogen of less than 1 mg/L.

6.4. Regulated Contaminants, Additional Chemicals and Contaminant Monitoring, and Total Organic Carbon Control

Based on the results from the water quality monitoring during the first six months (i.e., the first and second quarterly sampling results), the purified water met all drinking water standards that exist for the protection of human health (CDM, 2012). The standards include primary and secondary drinking water standards, disinfection by-products, and notification levels.

<u>Primary drinking water standards</u> Purified water met all primary standard criteria for all 91 pollutants, most measurements were below detection limits.

<u>Secondary drinking water standards</u> All 15 parameters were in compliance with the secondary standard, all below regulated levels.

<u>Disinfection byproducts</u> Disinfection byproduct levels were below regulatory requirements for drinking water.

<u>Notification Levels</u> All compounds were below drinking water notification levels.

Overall, the purified water met all treatment goals for the demonstration project. These goals were based on a combination of CDPH's November 2011 draft groundwater recharge regulations and RWQCB's Water Quality Control Plan for the San Diego Region (aka the Basin Plan).

CECs include currently-used pesticides, industrial chemicals, endocrine disrupting compounds, and pharmaceuticals and personal care products. The "Final Report Monitoring Strategies for CECs in Recycled Water, Recommendations of the Science Advisory Panel" (State Water Resources Control Board, 2010) recommended monitoring indicator compounds based on toxicological relevance (NDMA, 17 beta-estradiol, caffeine, and triclosan) and process performance indicators (DEET [N,N-diethyl-meta-toluamide], gemfibrozil, iopromide, and sucralose) in groundwater recharge projects. While the SWRCB report did not address surface water augmentation projects, this same monitoring program has been applied to the demonstration facility. Of the 91 chemicals of emerging concern monitored at the demonstration facility, all were non-detectable with the exception of low level detections of six compounds (theobromine, oxolinic acid, iohexal, diethanolamine, acesulfame-k, and triclosan). The results of the initial monitoring at the demonstration facility will be used to develop a customized monitoring program for chemicals of concern for the full-scale IRP/RA Project.

Total organic carbon (TOC) is an indicator of treatment process performance and can be used as a surrogate for the potential of a water supply to form disinfection byproducts. The purified water TOC and total disinfection byproducts were substantially lower than the imported water supply, and the TOC was consistently less than the target of 0.5 mg/L.

The testing indicated that NDMA concentrations were below the reporting limit of 2 ng/L.

Of the constituents in purified water measured at detectable and reportable levels, nearly all were present at lower concentrations than in the untreated imported water brought into the San Diego region.

6.5. Reliability and Redundancy

As a scalping plant, the NCWRP can go offline at any time either by ceasing diversion from the sewer or diverting off-specification product back to the sewer for treatment at PLWTP. The full-scale AWPF will also have the capability to go offline by ceasing to receive tertiary water from NCWRP or diverting off-specification water back to either the NCWRP head works or to the sewer for treatment at PLWTP. A variety of on-line monitoring techniques will be employed as noted in the next section.

Additionally, the Alvarado Water Treatment Plant is capable of receiving its full water demand from several other water sources that are not connected to San Vicente Reservoir. In the case of an extended discharge of off-specification purified water that would cause San Vicente Reservoir to exceed acceptable source water quality, it will be possible to discontinue San Vicente Reservoir draw to Alvarado Water Treatment Plant and use the other sources until the problem is resolved.

6.6. Monitoring and Response Plan

CDPH has included a response retention time requirement in its Draft Groundwater Recharge Regulations to address potential treatment failures. While this requirement is applicable to plug flow conditions found in groundwater recharge systems that produce water of drinking water quality, it is not amenable in a raw water reservoir setting where inflows mix through the entire reservoir during the critical winter destratified condition, and is subjected to subsequent surface water treatment with additional microbial and organic chemical removal capabilities. Although during most of the year substantial retention is provided by the reservoir, the predominant value of a large reservoir is the mixing and dilution that is achieved prior to withdrawal and conveyance to downstream water treatment.

For an IPR / reservoir augmentation setting, a monitoring and response plan needs to mitigate two types of hypothetical "treatment failures."

AWPF Malfunction This hypothetical event is characterized as a malfunction of a process or processes at the AWPF. As a worst case, this event would allow filtered NCWRP effluent to flow into the purified water conveyance pipeline. As noted, the purified water conveyance pipeline would provide up to 10 hours to identify a malfunction, validate the malfunction, and stop flows in the conveyance pipeline before the off-specification water would be released into San Vicente Reservoir. If necessary, water in the conveyance pipeline could be diverted into the sanitary sewer system. The City's strategy to address this type of an event is keyed to AWPF integrity monitoring, and is discussed in Section 7.6.1 below.

AWPF Source Water Excursion This hypothetical event is characterized as an elevated level of a constituent of concern in the source water to the AWPF, while the AWPF is operating as designed. This elevated level of constituent of concern would be identified during the routine periodic comprehensive water quality monitoring performed on the AWPF product. The size, mixing, and dilution capacity of San Vicente Reservoir enables the City to address this type of treatment failure, as described in Section 7.6.2 below.

6.6.1. AWPF Integrity Monitoring

The ability of the combination of MF, RO and AOP technologies to remove microbial and chemical contaminants from recycled water is well-established. The demonstration facility currently being tested using NCWRP filter effluent will provide further evidence of the capabilities of these technologies to purify the water that will be used for the full-scale IPR/RA Project. The AWPF will be fully capable of producing water that meets all applicable standards. The questions that must be addressed are: What happens if the plant is not operating properly? How long would it take to respond and correct an operational problem at the plant? What is the relative risk to the public attributable to an operational problem at the plant?

As part of the demonstration project, a Critical Control Point (CCP) monitoring plan for the AWPF is being prepared with input from both the IAP and regulators. It is anticipated that the CCP monitoring plan will be similar to the CCPs specified in the GWRS Operation, Maintenance, and Monitoring Plan, which has been approved by CDPH. The plan will be validated through water quality testing of the demonstration facility at various points along the treatment process. The main purpose of CCP monitoring plan is to provide a systematic approach for applying tools, techniques, and practices to monitor and maintain the integrity of the various AWPF unit processes. The following are key components of the CCP monitoring plan.

- Baseline performance of each unit process under “intact” conditions will be confirmed and established prior to start–up.
- Continuous verification of integrity will be maintained throughout the operational period.
- On-going maintenance and operational practices to mitigate integrity breaches will be implemented on all unit processes.
- The integrity data will be recorded and analyzed.
- Measurable performance criteria will be developed along with action plans to respond to changes in performance due to breaches in integrity.

The main feature of the CCP monitoring will be online (i.e., continuous and real-time) monitoring, online feedback, daily water quality verifications, and automatic control of the system to ensure each system unit is functioning properly. The current monitoring strategy at the demonstration facility has the following components.

- Monitoring of membrane filtration with daily pressure decay tests, bacterial analysis, and online turbidity.
- Monitoring of reverse osmosis with online TOC and online electrical conductivity. Ultra Violet transmittance is also an indication of RO performance.
- Monitoring of advanced oxidation with online UV transmittance, online power draw, and verification of hydrogen peroxide flow.

With appropriate alarms and shutoff mechanisms keyed to these on-line monitoring techniques, it is anticipated that one would know within minutes if there was a problem with system performance at the

AWPF. Response to events could range from heightened scrutiny of operating performance to diverting the purified water to the NCWRP headworks or sewer until the problem was isolated and corrected.

As noted, the travel time of the water from the AWPF pumping station to San Vicente Reservoir outlet structure through the conveyance pipeline is approximately 10 hours. If a treatment failure occurred and purified water was for some reason not immediately diverted, there would still be time to stop conveyance of the affected water to the reservoir. The pipeline could then be used to hold the affected water while the situation is monitored and resolved in consultation with CDPH. If necessary, the entire volume of the pipeline could be drained to sanitary sewer via dedicated infrastructure. These drains would be in the overall sewershed of the PLWTP; thus, all off-specification water retained in the pipeline would be sent to the PLWTP.

During the design phase of this project, the City would develop an AWPF on-line monitoring and response plan that provides sufficient features and assurances to demonstrate that any foreseeable AWPF malfunction could be identified and responded to, via product water diversion or other appropriate remedy, within the conveyance time afforded by the purified water conveyance pipeline. Design features would be incorporated into the purified water conveyance pipeline design to drain off-specification water away from the reservoir and to the sewer.

6.6.2. San Vicente Reservoir Retention and Blending

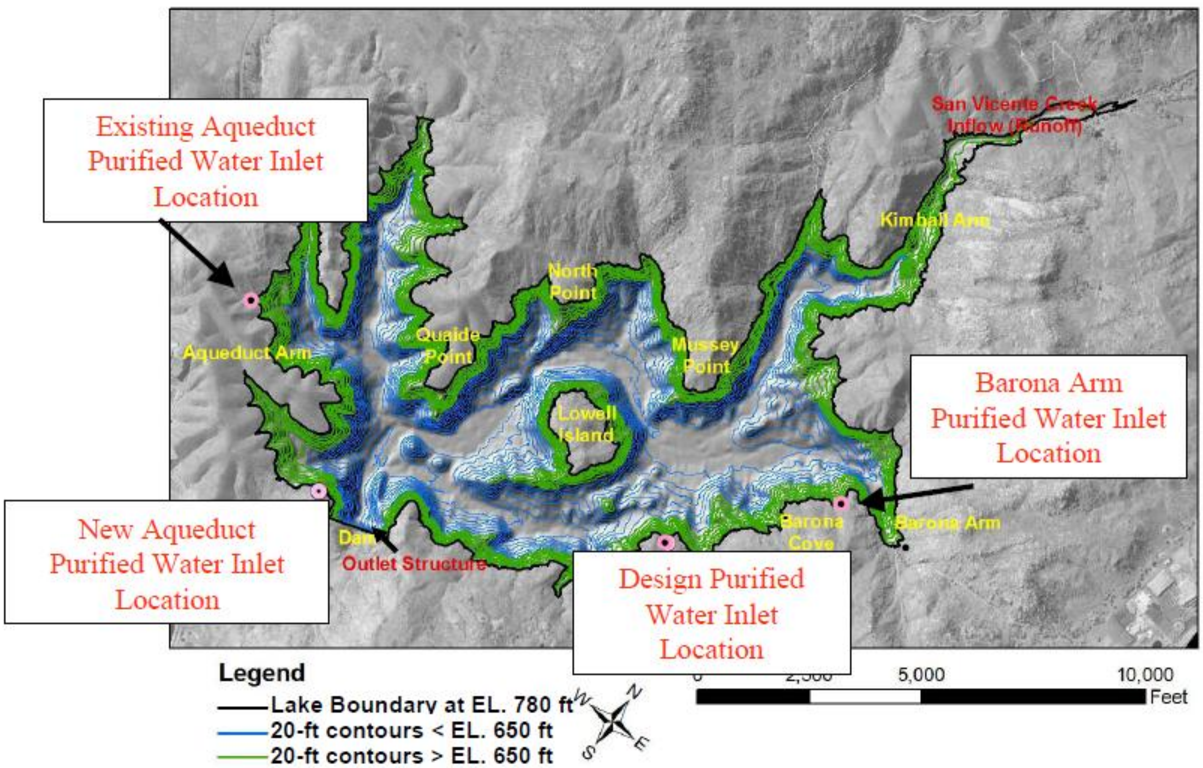
The primary purpose of including San Vicente Reservoir in the full-scale IPR/RA project is to provide substantial retention and blending of purified water in a natural setting prior to delivering it to a water treatment plant for final treatment and distribution. In other words, the reservoir acts as an environmental buffer to significantly dilute any constituents that may be conveyed to the reservoir with the purified water. In the event of a treatment failure not detected by on-line monitoring, such as a source water excursion, San Vicente Reservoir would protect the downstream water treatment plant from receiving compromised source water.

One of the key characteristics of San Vicente Reservoir is the presence of distinct density stratification - a thermocline - separating the epilimnion (the top-most layer in a stratified reservoir) from the hypolimnion (the dense, bottom layer in a stratified reservoir) throughout much of the year. Density stratification persists for about ten months of every year. The consistent and predictable density stratification of San Vicente Reservoir is demonstrated by monitoring data spanning twenty-two years. During the period of stratification, warm light water - and associated constituents - in the epilimnion does readily not mix with the colder heavier water in the hypolimnion. The purified water inflow will be at the surface, and the purified water itself is warm and light; thus, the inflowing purified water will remain in the epilimnion. Outflows from the reservoir are typically deep. This provides is a substantial barrier to short-circuiting of purified water throughout the period of stratification. For a short period each year San Vicente Reservoir loses stratification (i.e., mixes top to bottom). This loss of stratification occurs during winter when the epilimnion cools and water temperature throughout the reservoir equalizes. The fully destratified condition lasts for a few weeks to a month and typically happens in January, February, or March. During the destratified period the reservoir becomes fully mixed, with incoming purified water flows mixing with the entire reservoir volume prior to reaching the reservoir outlet. This mixing and associated dilution would attenuate any AWPF source water excursion or unforeseen extended AWPF malfunction.

As part of the demonstration project, a three-dimensional model of San Vicente Reservoir was developed to evaluate the hydrodynamic and water quality effects of augmenting the reservoir wit purified water (Flow Science, 2010). The model was used to predict residence time, blending, and dilution that will occur over a range of reservoir operating conditions (Flow Science, 2011). The modeling scenarios vaired the following reservoir characteristics.

- Reservoir operations with and without the addition of purified water.
- Operating the reservoir in normal years, over an extended drought, and during an emergency drawdown.
- Introducing purified water into the reservoir in one of four different inlet locations.

Modeled Inlet Locations



The model was calibrated using real-world monitoring data, and validated using field tracer work conducted in the 1990's. The model was then used to simulate eight reservoir operating scenarios. In each of these simulations, various hypothetical tracers were added to the purified water inflow to illustrate the transport, mixing, and dilution of constituents carried with the purified water. In particular, decaying tracers (decay rate of 1 log per month, i.e., a reduction in concentration by a factor of 10 per month) were used to study the dilution and inactivation of potential pathogens entering the reservoir and to evaluate the ability of the reservoir to reduce pathogen concentration before they reach the reservoir outlet. Non-decaying tracers were used to simulate chemical constituents. In all simulations, tracers were added to the reservoir's inflow over a 24-hour period, which is analogous to simulating the reservoir's response to a system failure at the AWPF which leads to the release of off-specification product to the reservoir for a full day. This 24-hour tracer release period was an assumption to support reservoir modeling, and is not related to an hypothetical treatment failure duration.

The IAP reviewed the development and validation of this model and concluded that the model "is a robust tool for simulating reservoir performance" (NWRI, 2010) and "the modeling effort has resulted in an effective and robust model that the City can use to assess the hydrodynamic response of the reservoir" (NWRI, 2012).

There are four key findings of the 3-dimensional hydrodynamic modeling study.

- The addition of purified water into the reservoir does not impact the duration or strength of stratification.
- San Vicente Reservoir provides a substantial barrier to pathogenic organisms due to natural features including photolysis, temperature, and natural predation. Using CDPH's virus reduction metric of 1 log/month in a groundwater setting (this assumption was approved by IAP as reasonable, albeit conservative), San Vicente Reservoir provides greater than 6-log virus reduction for the ten months of each year the reservoir is stratified, and at least a 2-log virus reduction during the destratified portion of the year.
- For all anticipated reservoir operational scenarios and purified water inlet locations, including emergency drawdown and extended drought scenarios, at all times the reservoir provides at least a 200:1 dilution of a 24-hour purified water release event prior to withdrawal from the reservoir.
- During typical operations and using the inlet location currently under consideration (referred to in reservoir hydrodynamic modeling as "design inlet location"), the reservoir provides greater than 2000:1 dilution of a 24-hour purified water release event prior to withdrawal from the reservoir.

6.6.3. Mitigation of a Treatment Failure by San Vicente Reservoir

San Vicente Reservoir provides safety features for both types of hypothetical "treatment failures" in an IPR/RA setting. This mitigation is provided by substantial retention and mixing during the stratified (predominant) portion of the year, and by mixing and dilution during the destratified (lesser) portion of the year.

<u>AWPF Malfunction</u> As noted, the City will develop a plan to identify and respond to an AWPF malfunction using a combination of treatment process integrity and on-line monitoring, plus the travel time in the purified water conveyance pipeline. The reservoir provides a backup protection should that AWPF malfunction last longer than 10 hours. As described above, the minimum dilution a 24-hour release of AWPF flow would undergo in the reservoir prior to withdrawal and conveyance to a downstream water treatment plant is 200:1. This means that in order for a chemical constituent of concern with acute health implications to impair San Vicente Reservoir as a raw water source, the concentration of that constituent over the 24 hour period would need to be in excess of 200 times the applicable MCL or notification level. In reviewing the results of tertiary effluent monitoring at NCWRP over the last several years, there is no monitored chemical constituent that approaches this level.

<u>AWPF Source Water Excursion</u> The primary benefit of the reservoir would be to retain and dilute an extended discharge of a constituent due to its elevated level in the wastewater source to the AWPF, while the AWPF is operating as designed. This benefit can be quantified in terms of mixing and dilution that would be provided by the reservoir during an extended "event." Assuming a monthly comprehensive water quality monitoring frequency, and a second month to identify and respond to a water quality excursion, a hypothetical elevated constituent discharge might occur for up to 60 days before corrected. Assuming the reservoir is a nominal 175,000 AF, for an 18 mgd discharge (highest flow being proposed), it would require that an acutely toxic contaminant level being discharged over that 60 day period (having undergone full AWPF) would need to be roughly 50 times greater than the applicable MCL or notification level to impair the reservoir as a raw water source. This is obviously a highly unlikely scenario.

These scenarios illustrate that implementation of AWPF integrity monitoring combined with the volume and mixing capability in San Vicente Reservoir provides a robust combination of reliability features, assuring that IPR/RA can be implemented at San Vicente Reservoir in a safe and reliable manner.

Section 7 Elements of the Suggested Regulatory Framework

Sections 1 through 6 describe the many studies the City has conducted to assess the potential of blending purified water from the NCWRP into San Vicente Reservoir while maintaining adequate and redundant public health safeguards. The results of these studies have been affirmed by an Independent Advisory Panel and reviewed by the California Department of Health Services. Based on this body of work, and the successful operation of potable reuse projects elsewhere in California, the following elements are offered for CDPH's consideration in establishing the regulatory framework for this project.

- Wastewater source control
  - Establishment of an enhanced source control program for the NCWRP service area similar to that established for Orange County's Groundwater Replenishment System (GWRS) project
- At the North City Water Reclamation Plant (NCWRP)
  - Flow equalization to deliver a constant flow to the AWPF
  - Achievement of full nitrification in the secondary aeration process
  - Operation with no return flows from biosolids processes (biosolids from NCWRP are processed off-site)
  - Tertiary filtered effluent will be the source water for the AWPF
- At the Advance Water Purification Facility (AWPF)
  - Treatment of entire flow stream with reverse osmosis (RO) meeting applicable CDPH specifications and performance measures
  - Treatment of entire flow stream with advanced oxidation (AOP) meeting applicable CDPH specifications and performance measures
  - Implementation of a Critical Control Point Monitoring Plan that includes surrogate indicators recommended by the industry at time of implementation
  - Ability to identify a potential treatment malfunction (based on CDPH-approved on-line process performance monitoring systems), validate that malfunction, and divert AWPF product from the conveyance pipeline in less time than the retention time provided by the conveyance pipeline prior to release to the reservoir (minimum travel time for San Diego project is 10 hours)
  - Certified operator on-site at all times (24 hours/day)
- At San Vicente Reservoir
  - A 12-month theoretical hydraulic retention will be maintained in the reservoir at all times
  - Location of the purified water inflow and the reservoir outflow such that short-circuiting of purified water from the inlet to the outlet is minimized
  - Minimum dilution of purified water with ambient reservoir water, at the outflow, of 100:1 to be maintained at all times
  - Criteria to minimize short circuiting and the criteria for dilution of purified water at the outflow [i.e., the second and third criteria above] to be demonstrated using a calibrated and validated hydrodynamic model

- Purified water will be discharged above the thermocline, and withdrawals will be below the thermocline, when a thermocline is present
- Water from reservoir to be treated at a full conventional water treatment plant before distribution as potable water
- Ability to take the reservoir offline as a source of supply to the municipal water system within 24 hours to be maintained at all times

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Appendix B: California Department of Public Health Concept Approval Letter

State of California—Health and Human Services Agency
California Department of Public Health

RON CHAPMAN, MD, MPH
Director & State Health Officer

EDMUND G. BROWN JR.
Governor

September 7, 2012

Roger S. Bailey
Director, Public Utilities Department
City of San Diego
9192 Topaz Way, MS 901
San Diego, CA 92123

Marsi Steirer
Deputy Water Department Director
City of San Diego
600 B Street, 13th Floor
San Diego, CA 92101

Dear Mr. Bailey and Ms. Steirer:

CITY OF SAN DIEGO SAN VICENTE RESERVOIR AUGMENTATION CONCEPT

The California Department of Public Health (CDPH) has reviewed the March 22, 2012, City of San Diego Water Purification Demonstration Project, Proposal to Augment San Vicente Reservoir with Purified Recycled Water (Report) and the City of San Diego San Vicente Reservoir Augmentation Concept Summary. The purpose of this letter is to respond to the City's request for CDPH review and approval of the project concept.

The City of San Diego's (City) proposed project for surface water augmentation (SWA) using advance treated recycled water would be the first planned project of its type in California. To obtain CDPH approval for an actual SWA project, the City must provide an adequate basis for CDPH to make a finding that the SWA project "poses no significant threat to public health", as required in the Health & Safety Code (H&S Code), Section 116551. CDPH has authority to condition a permit (H&S Code Section 116540) "as it deems necessary to assure a reliable and adequate supply of water at all times that is pure, wholesome, potable, and does not endanger the health of consumers." Nothing in this letter is intended to waive CDPH's authority.

The final design, engineering report, operations plan, contingency plan, response plan, and water quality monitoring plan for this project have not yet been developed; all of these are required prior to being issued a permit.

Based on CDPH's review of the City's March 22, 2012, submittal, CDPH has concluded that the project, as conceived, when properly designed, constructed, and operated, will not compromise the quality of the water derived from the San Vicente Reservoir. Therefore, CDPH approves the San Vicente Reservoir Augmentation Concept.

In order for CDPH to permit the project and make the finding that the project poses no significant threat to public health, the City will need to provide the additional information outlined above, including, but not limited to, the final design, engineering report, operations plan, contingency plan, response plan, and water quality monitoring plan.

CDPH staff will continue to be available to your staff for technical discussions and to answer questions on CDPH's requirements for SWA projects. If you have any questions on these comments or would like to discuss them, please contact me at (916) 449-5577.

Sincerely,

Leah G Walker

Leah Godsey Walker, P.E., Chief
Division of Drinking Water and Environmental Management

cc:

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Appendix C: San Diego Regional Water Quality Control Board Resolution of Support

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California Regional Water Quality Control Board
San Diego Region
Over 50 Years Serving San Diego, Orange, and Riverside Counties
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http:// www.waterboards.ca.gov/sandiego

Edmund G. Brown Jr.
Governor

October 24, 2011

In reply refer to:
244506:JCOFRANCESCO

Ms. Marsi A. Steirer
Deputy Director, Public Utilities Department
City of San Diego
600 B Street, Suite 600, MS 906
San Diego, CA, 92101

Dear: Ms. Steirer

SUBJECT: ADOPTION OF RESOLUTION NO. R9-2011-0069, A RESOLUTION IN SUPPORT OF THE CITY OF SAN DIEGO'S SAN VICENTE RESERVOIR AUGMENTATION PROJECT

Thank you again for coming to the San Diego Water Board meeting on October 12, 2011. The information that you provided to the Board Members demonstrate the City's efforts to bring more sustainable local water to our region. The San Diego Water Board's adoption of Resolution No. R9-2001-0069 and their comments during the meeting show that they are in support of the City's efforts and look forward to the possibility of indirect potable reuse in the San Diego Region. My staff and I will continue to work closely with the City to resolve any remaining water quality requirements related to the San Vicente Reservoir Augmentation Project.

Enclosed is a copy of the adopted resolution for your records. Please do not hesitate to contact myself or my staff (Joann Cofrancesco at 858-637-5589 or jcofrancesco@waterboards.ca.gov) regarding this project.

Respectfully,

David W. G

DAVID W. GIBSON
Executive Officer

DWG:dtb:rwm:jlc

cc: (by email): Anthony Van, City of San Diego, Associate Engineer-Civil, AVan@sandiego.gov
Enclosures: Resolution No. R9-2011-0069

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

RESOLUTION NO. R9-2011-0069

A RESOLUTION IN SUPPORT OF THE CITY OF SAN DIEGO'S SAN VICENTE RESERVOIR AUGMENTATION PROJECT

WHEREAS, the California Regional Water Quality Control Board, San Diego Region (hereinafter, San Diego Water Board), finds that:

1. California Water Code section 13510 states, *the people of the state have a primary interest in the development of facilities to recycle water containing waste to supplement existing surface and underground water supplies and to assist in meeting the future water requirements of the state.*

2. The Strategic Plan Update 2008-2012 for the Water Boards includes a priority to increase sustainable local water supplies available for meeting existing and future beneficial uses.

3. The City of San Diego (City) has prepared a water recycling plan entitled, City of San Diego, Recycled Water Master Plan Update 2005 (Master Plan), which identifies non-potable reuse opportunities for recycled water. Subsequently the City prepared the Water Reuse Study Final Draft Report, March 2006, which includes the Master Plan and identifies opportunities for indirect potable reuse (IPR). In October 2007, the San Diego City Council recognized San Vicente Reservoir Augmentation as their preferred IPR strategy.

4. To determine the feasibility of a full-scale reservoir augmentation project, the City of San Diego is currently evaluating the use of advanced water purification technology to provide safe and reliable water. Should this evaluation prove successful, the City plans to construct a full-scale advanced water treatment plant to supplement the current treatment processes at its North City Water Reclamation Plant and a 23-mile pipeline to transport the advanced treated recycled water to San Vicente Reservoir, where it would blend with imported untreated water and reside for several months (per state health regulation) prior to being sent to water treatment plants for additional treatment and distribution as potable water.

5. The San Diego Water Board has a long history of taking actions in support of beneficial water recycling projects in the Region. These actions included amending the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) in 1996 to provide an exception to the prohibition for recycled water discharges to a lake or reservoir used for municipal water supply.

6. On September 22, 2011, this item was publicly noticed in the Meeting Notice and Agenda, which was posted on the San Diego Water Board's website and distributed to interested persons via the ListServ Management System.

7. On October 12, 2011, the San Diego Water Board conducted a public hearing on tentative Resolution No. R9-2011-0069.

NOW THEREFORE, BE IT RESOLVED THAT, the San Diego Regional Water Quality Control Board:

1. Supports the efforts to develop the Reservoir Augmentation Project at the San Vicente Reservoir as a means to reduce reliance on imported water, increase the use of recycled water, and to implement goals in California Water Code section 13510 and the 2008-2012 Strategic Plan Update for the Water Boards.

2. In accordance with implementation provisions of the Basin Plan, the San Diego Water Board will regulate San Diego Region recycled water reservoir augmentation projects through the issuance of project-specific NPDES Permits.

3. Reservoir augmentation NPDES permits issued by the San Diego Water Board will incorporate requirements established and the provisions recommended by California Department of Public Health.

I, David W. Gibson , Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, San Diego Region, on October 12, 2011.

David W. Gibson
Executive Officer

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Appendix D: Proposed Regional Water Quality Control Board Compliance Approach

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PROPOSED REGIONAL WATER QUALITY CONTROL BOARD COMPLIANCE APPROACH

Final Draft

City of San Diego

Water Purification Demonstration Project

San Vicente Reservoir Augmentation

August 2012

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List of Abbreviations

AF	acre-feet
AFY	acre-feet per year
AWP Facility	Advanced Water Purification Facility
Basin Plan	*Water Quality Control Report for the San Diego Region*
CEQA	California Environmental Quality Act
CDPH	State of California Department of Public Health
CFR	*Code of Federal Regulations*
CTR	California Toxics Rule
CWA	Clean Water Act
Demonstration Project	City of San Diego Water Purification Demonstration Project
DO	dissolved oxygen
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
FSI	Flow Science Incorporated
full-scale project	Full-scale indirect potable reuse (reservoir augmentation) project
IAP	Independent Advisory Panel
MCL	Maximum Contaminant Level (drinking water standard)
mgd	million gallons per day
mg/l	milligrams per liter
NCWRP	City of San Diego North City Water Reclamation Plant
N:P	ratio of total nitrogen to total phosphorus
NPDES	National Pollutant Discharge Elimination System
NWRI	National Water Research Institute
Point Loma	City of San Diego E.W. Blom Point Loma Wastewater Treatment Plant
Regional Board	California Regional Water Quality Control Board, San Diego Region
RO	reverse osmosis
TM	Technical Memorandum
Title 22	Division 4, Chapter 3, Title 22 of the *California Code of Regulations*
UV	ultraviolet

Summary

The City of San Diego has implemented the Water Purification Demonstration Project (Demonstration Project) to assess the feasibility of a full-scale indirect Potable Reuse/Reservoir Augmentation project (hereinafter full-scale project) at San Vicente Reservoir. The Demonstration Project includes a 1 million gallon per day (mgd) advanced water purification facility (AWP Facility) at the North City Water Reclamation Plant and associated treatment, reservoir modeling and limnology studies to assess full-scale project feasibility.

One of the key objectives of the Demonstration Project is to coordinate with the California Department of Public Health (CDPH) and California Regional Water Quality Control Board, San Diego Region (Regional Board) to identify applicable regulatory requirements for reservoir augmentation. Using guidance received from CDPH staff and input from an Independent Advisory Panel of recognized public health and water quality experts, the City has submitted a project proposal to CDPH that (1) outlines the City's proposed concept for a full-scale project at San Vicente Reservoir, and (2) requests CDPH conceptual approval of a full-scale project at San Vicente Reservoir.

This report summarizes the proposed San Vicente Reservoir water purification concept, and identifies key permitting issues and Regional Board regulatory decisions and actions that would be required in order for the Regional Board to approve a full-scale project at San Vicente Reservoir.

In October 2011, the Regional Board adopted Resolution No. R9-2011-0069, which expressed support for the City's water purification project concept. The resolution also outlined the Regional Board's approach toward permitting a full-scale project at San Vicente Reservoir through the issuance of a NPDES (National Pollutant Discharge Elimination System) permit that implements requirements established within the Regional Board's *Water Quality Control Plan for the San Diego Basin* (Basin Plan).

AWP Facility monitoring data indicate that the purified water supply will be equal to or superior in quality to existing San Vicente Reservoir inflows for virtually all constituents. Nitrogen may be the only exception to this, as purified water nitrogen concentrations will be slightly higher than existing imported water inflows to San Vicente Reservoir, but superior in quality to the local runoff captured within the reservoir. Comprehensive reservoir modeling conducted as part of the Demonstration Project, however, indicate that nitrogen concentrations under a full-scale project at the expanded San Vicente Reservoir are projected to be lower than historic nitrogen concentrations in the reservoir.

While the Regional Board supports the proposed water purification and reservoir augmentation concept, Regional Board staff indicate that the Regional Board has yet to address two key procedural questions which will determine the exact pathway the City will need to take to proceed with applying for and receiving a NPDES permit for a full-scale project. These questions include:

1. Prior to the Regional Board's consideration of a NPDES permit for a full-scale project at San Vicente Reservoir, will the Regional Board, State Water Resources Control Board (State Board), and U.S. Environmental Protection Agency (EPA) need to take actions to modify the Clean Water Act (CWA) Section 303(d) impaired water list for San Vicente Reservoir?
2. Prior to the Regional Board's consideration of a NPDES permit for a full-scale project at San Vicente Reservoir, will the Regional Board, State Board, and EPA need to modify any requirements within the Regional Board's Basin Plan?

The City understands that the Regional Board is currently coordinating with EPA and the State Board to address these questions. If the answer to both pending questions is "no", the pathway for project approval is straight-forward, and the City could be in a position to submit an application to the Regional Board for a NPDES permit for a full-scale project at San Vicente Reservoir in less than 18 months after the date the City Council approves and funds the project. The City believes that this direct approval pathway (no Basin Plan modification or 303(d) list revisions) is both feasible and appropriate.

If the Regional Board, State Board, or EPA determine that the answer to either or both pending questions is "yes", the full-scale project remains feasible, but the project implementation schedule would be lengthened. In this event, four to five years may be required to achieve modifications in the 303(d) list and/or Basin Plan to procedurally support the Regional Board's issuance of a NPDES permit for a full-scale project at San Vicente Reservoir.

The City requests that Regional Board staff coordinate with State Board and EPA staff to determine whether the Regional Board can move forward with implementing attainable NPDES requirements for a full-scale reservoir augmentation project without the need for (1) revision of the San Vicente Reservoir 303(d) listings, or (2) modification of the Basin Plan. The City also requests any guidance or recommendations the Regional Board can offer relative to implementing a full-scale reservoir augmentation project at San Vicente Reservoir.

Section 1 Purpose of Report

The City of San Diego proposes an indirect potable reuse project (also known as reservoir augmentation) that would supplement the approximate 240,000-acre-foot San Vicente Reservoir with up to 15,000 acre-feet per year (AFY) of purified recycled water produced at an advanced water treatment facility that would be sited at the City's North City Water Reclamation Plant (NCWRP). This report:

(1) summarizes results from the City's Water Purification Demonstration Project (Demonstration Project) that is assessing the feasibility of full-scale project at San Vicente Reservoir,

(2) describes the proposed concept for introducing purified water from a full-scale project to San Vicente Reservoir,

(3) summarizes permitting guidance received from the staff of the California Regional Water Quality Control Board, San Diego Region (Regional Board),

(4) identifies two key pending Regional Board decisions that will determine how the City proceeds with Regional Board NPDES permitting requirements, and

(5) identifies the approach preferred by the City for achieving project approval from the Regional Board.

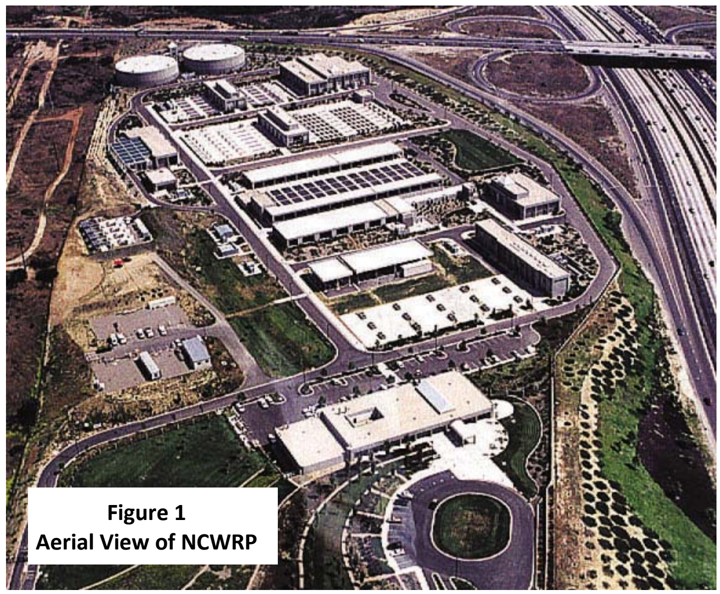


Figure 1
Aerial View of NCWRP

Section 2 Water Purification Demonstration Project

Planning Background. In 1994, the City, in partnership with the San Diego County Water Authority, initiated a series of technical studies to assess the potential for indirect potable reuse at San Vicente Reservoir. Based on the results of these studies, which included pilot testing of advanced treatment technologies and studies of reservoir hydrodynamics, the Department of Health Services (now called California Department of Public Health, or CDPH) issued conditional concept approval for that project in 1994.

Demonstration Project Elements. The City chose not to pursue indirect potable reuse in the 1990s, but in 2007 the City of San Diego City Council issued a directive to initiate a renewed feasibility assessment of the concept at San Vicente Reservoir. In accordance with this Council action, the Public Utilities Department launched the Demonstration Project. Key elements of the Demonstration Project include:

- Constructing a 1 mgd advanced water purification facility (AWP Facility) at the NCWRP and operating the facility for one year to assess treatment technologies and the effectiveness of purified water treatment.
- Initiating a comprehensive hydrodynamic study that included three-dimensional modeling of San Vicente Reservoir to assess hydrodynamic, water quality, and biostimulation issues at the reservoir.
- Coordinating with CDPH and the Regional Board to define probable regulatory requirements for a full-scale project.
- Implementing a public education and outreach program.
- Conducting energy and economic analyses.

The National Water Research Institute (NWRI) assembled a ten-member Independent Advisory Panel (IAP) to provide independent expert oversight of the Demonstration Project effort. Table 1 presents the IAP members.

Table 1
NWRI Independent Advisory Panel (IAP)

IAP Panel Members and Organizations	
George Tchobanoglous, Ph.D., P.E. (IAP Chair) University of California, Davis	Richard Gersberg, Ph.D., (IAP Vice-Chair) San Diego State University
Michael Anderson, Ph.D. University of California, Riverside	Richard Bull, Ph.D. Consulting Toxicologist
Joseph Cotruvo, Ph.D. Joseph Cotruvo Associates	James Crook, Ph.D., P.E. Water Reuse and Public Health Consultant
Sunny Jiang, Ph.D. University of California, Irvine	Audry D. Levine, Ph.D., P.E., DEE U.S. Environmental Protection Agency
David R. Schubert, Ph.D. Salk Institute for Biological Studies	Michael P. Wehner Orange County Water District

Treatment Studies. The 1 mgd AWP Facility utilizes tertiary treated water from the NCWRP as a source of influent. AWP Facility treatment processes consist of:

- membrane filtration,
- reverse osmosis (RO),
- ultraviolet (UV) disinfection, and
- advanced oxidation.

Figure 2
AWP Facility RO Units

On the basis of data collected since operation of the AWP Facility was initiated in July 2011, the City has concluded that:

- NCWRP recycled water (the influent to the AWP Facility) typically complies with most CDPH drinking water Maximum Contaminant Levels (MCLs).
- Concentrations of minerals in the purified water are significantly lower than existing imported supplies.
- Concentrations of phosphorus in the purified supply are near zero.
- Concentrations of nitrogen in the purified water are comparable (but depending on the blend of Colorado River and State Water Project supplies, can be slightly higher than) the existing imported water supply.
- The purified water consistently and reliably complies with all CDPH MCLs.
- The advanced purification processes provide a level of reliability and pathogen inactivation that is consistent with (or is superior to) anticipated CDPH requirements.
- The advanced purification treatment process train utilized as part of the Demonstration Project is appropriate for a full-scale project.

Reservoir Limnology Studies: Hydrodynamics. As a key element of the Demonstration Project, the City has completed a comprehensive Reservoir Detention and Limnology Study of San Vicente Reservoir (Limnology Study) to assess how a potential full-scale project might influence hydrodynamic, water quality, and biostimulation conditions within San Vicente Reservoir. The primary advantage of retaining purified water in San Vicente Reservoir is to provide substantial retention and blending of purified water in a natural setting prior to delivering it to a water treatment plant for final potable water treatment and distribution. Such reservoir retention provides an environmental buffer between purified water treatment and potable water treatment. This environmental buffer effect is provided through the following:

- *Thermal Stratification.* Above a temperature of 4° C (39° F), warmer waters are less dense than cooler waters. As reservoir surface waters warm in the spring months, the warmer buoyant waters remain near the reservoir surface, resulting in further warming by convective and solar radiation. By mid-spring, a strong thermocline is formed which acts as a barrier to separate the warmer surface waters (epilimnion) from the deeper cool waters (hypolimnion). In San Vicente Reservoir, this thermal stratification persists for approximately 10 months each year, until winter when epilimnion temperatures are reduced to the point where wind-driven energy is sufficient to completely mix the reservoir. A full-scale project would take advantage of this thermal stratification by discharging less dense (warmer and less saline) purified water to the epilimnion and withdrawing raw potable supplies from the hypolimnion. Using this technique, the thermal stratification provides for significant retention times and a significant barrier to reservoir short-circuiting (e.g. preventing the withdrawal of purified water soon after it is introduced to the reservoir).

- *Reservoir Size*. San Vicente Reservoir is currently undergoing an expansion that will raise the height of San Vicente Dam by 117 feet and increase the reservoir storage capacity from 90,000 AF to over 240,000 AF. The introduction of 15,000 AFY of purified water to San Vicente Reservoir would represent a relatively modest annual quantity compared to the reservoir capacity, and would result in significant dilution. During times the reservoir is not thermally stratified, this high degree of dilution would ensure that only a small fraction of reservoir waters withdrawn during complete mix conditions would be comprised of recently introduced purified water.

Figure 3
San Vicente Reservoir Prior to Expansion

As an initial element of the Limnology Study, Flow Science Incorporated (FSI) calibrated a numerical three-dimensional model (ELCOM) of San Vicente Reservoir hydrodynamics. Model results were verified by utilizing observed reservoir and tracer study data. The results of this analysis were documented in two Limnology Study Technical Memoranda (FSI, 2010; FSI 2011).

The Technical Memoranda and model were peer-reviewed by the IAP, which concluded that the ELCOM model was "an effective and robust tool" for simulating thermoclines and hydrodynamics of the San Vicente Reservoir and assessing options for the purified water inlet location. (NWRI, 2010)

FSI used the calibrated model to simulate augmenting San Vicente Reservoir inflow with purified water under a range of future operating conditions, including:

- alternatives with and without the addition of purified water,
- normal, extended drought, and emergency drawdown reservoir operating scenarios, and
- four alternative purified water inlet locations (see Figure 4 on page 7).

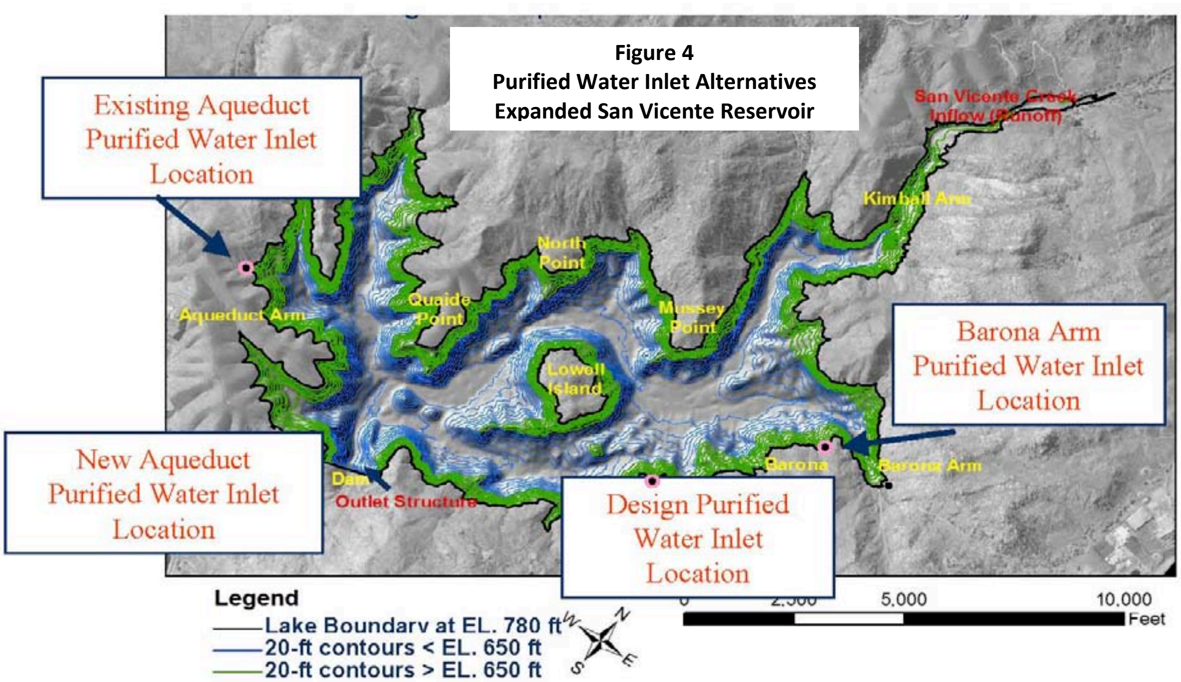


Figure 4
Purified Water Inlet Alternatives
Expanded San Vicente Reservoir

Key conclusions of the hydrodynamic modeling effort presented by FSI (2011) include:

- Expansion of San Vicente Reservoir will increase the volume of the hypolimnion, but will not discernibly affect the depth, duration or strength of thermal stratification.
- The reservoir would provide a substantial barrier to pathogen organisms due to solar radiation (photolysis effects), temperature effects and natural predation.
- For all anticipated reservoir operational scenarios and purified water inlet locations, at all times the reservoir provides at least a 200:1 dilution of a 24-hour purified water release event prior to withdrawal.
- During typical operations and using the inlet location currently under consideration (referred to in reservoir hydrodynamic modeling as "design inlet location"), the reservoir provides greater than 2000:1 dilution of a 24-hour purified water release event prior to withdrawal.

Reservoir Limnology Studies: Water Quality and Biostimulation. As an additional element of the Limnology Study, FSI superimposed and calibrated an aquatic ecosystem dynamics model (CAEDYM) on the ELCOM hydrodynamic model. The CAEDYM model (see Figure 5 on page 8) assesses nutrient loads, nutrient concentrations, water clarity, and algae. Model results were verified by utilizing observed nutrient concentrations, algae concentrations and Secchi disk data from San Vicente Reservoir. Results of the nutrient and biostimulation modeling effort were documented in Limnology Study Technical Memorandum #3 (FSI, 2012a). The nutrient and biostimulation Technical Memorandum and the model were peer-reviewed by the IAP, which concluded that the combined hydrodynamic/nutrient model (ELCOM plus CAEDYM) was an effective and robust tool for assessing biological water quality for nutrients. (NWRI, 2010)

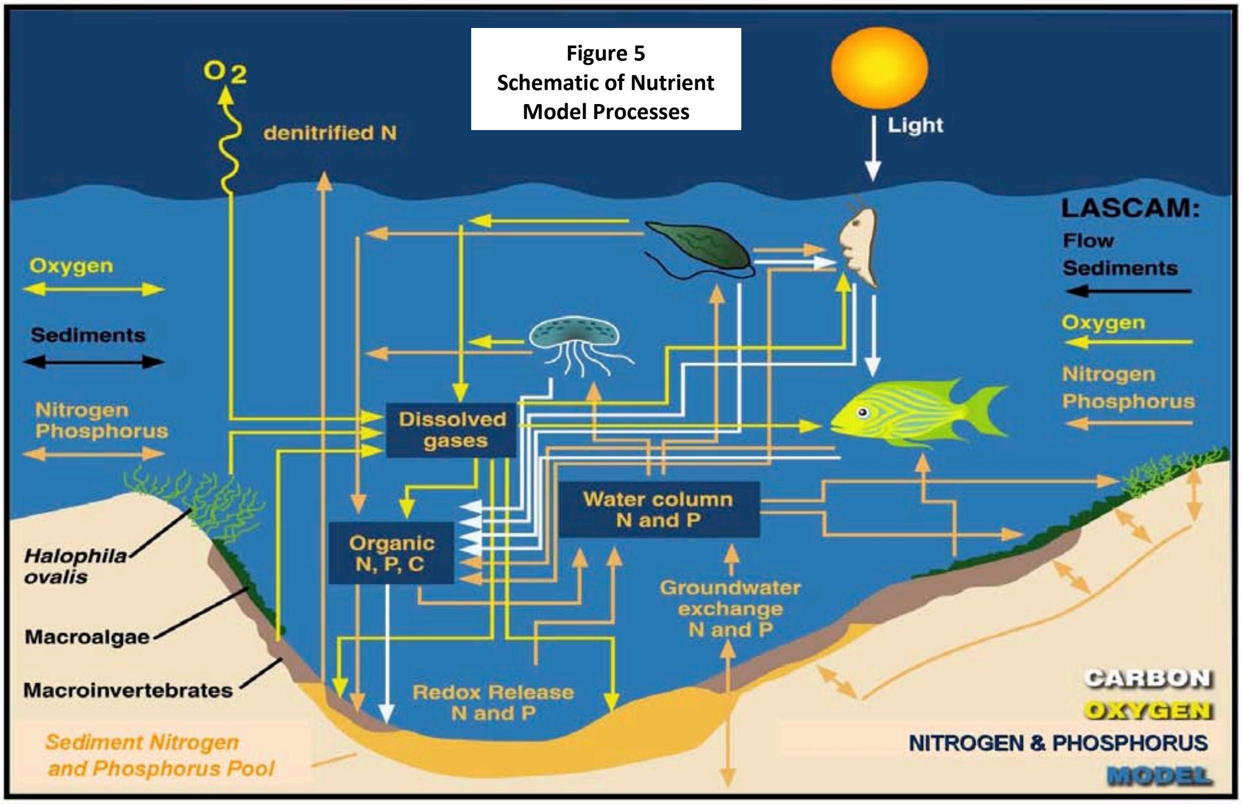


Figure 5
Schematic of Nutrient Model Processes

FSI used the calibrated ELCOM plus CAEDYM model to simulate nutrient and biostimulation conditions at San Vicente Reservoir under:

1) existing conditions prior to reservoir expansion (Existing Case),
2) the expanded reservoir with no purified water inflow (No Purified Water Case), and
3) the expanded reservoir with purified water inflow (Base Case).

As part of the modeling effort, FSI used data from the AWP Facility to estimate purified water nitrogen and phosphorus concentrations. Observed nitrogen and phosphorus data from 2006-2007 were used to characterize nitrogen and phosphorus concentrations in the San Vicente Reservoir runoff inflow and imported water inflow. Table 2 (page 9) compares nitrogen and phosphorus concentrations in the reservoir inflow sources.

Key conclusions of the nutrient and biostimulation modeling effort presented by FSI (2012a) include:

- Nutrient sediment release from the reservoir bottom constitutes a significant portion of all nutrient loadings into the reservoir water column for all modeled scenarios.
- Expansion of the reservoir will result in increased sediment nutrient loadings as a result of increased depth and wetted sediment surface area.

- Despite the higher sediment nutrient releases for the expanded reservoir, nutrient concentrations in the water column are projected to be reduced due to the larger volume of water in the expanded reservoir.
- Concentrations of chlorophyll-α in the epilimnion are simulated as being reduced for all expanded reservoir scenarios, likely as a result of projected reductions in water column nutrient concentrations.
- Under all simulated scenarios, anoxic conditions are projected to occur in the hypolimnion once oxygen demands use up the available dissolved oxygen. This effect naturally occurs in all thermally stratified reservoirs, independent of whether or not purified water is introduced.
- San Vicente Reservoir hypolimnion volumes are significantly increased as a result of reservoir expansion for all simulated scenarios. This increased hypolimnion volume will lead to a slight increase in the number of days that anoxic conditions occur in the hypolimnion for the simulated reservoir expansion scenarios, regardless of whether or not purified water is introduced to the reservoir.
- Chlorophyll-α concentrations will be lower and average Secchi depths will be greater (i.e., improved water clarity) in the expanded reservoir than in the existing reservoir, regardless of whether or not purified water is introduced into San Vicente Reservoir.
- Since the nitrogen:phosphorus (N:P) ratio in the purified water is projected to be approximately 160:1, the Base Case scenario (expanded reservoir with purified water inflow) is projected to be more phosphorus-limited than historic (90,000 AF reservoir capacity) conditions.

Table 2
San Vicente Reservoir Inflow Nutrient Concentrations[1]

Parameter	Concentration in mg/l		
	Purified Water[2]	Imported Water Inflow[3]	Runoff Inflow[4]
Nitrate and nitrite	0.64	0.12 - 0.47	0.02 - 3.0
Ammonia[5]	0.14	0.02 - 0.09	0.02 - 0.5
Total nitrogen	0.78	0.17 - 0.68	0.18 - 4.2
Total phosphorus	0.004	0.024 - 0.081	0.22 - 0.32

1 From FSI (2012a).
2 Based on results of DEMONSTRATION PROJECT demonstration plant effluent data for 2011-2012.
3 Range of observed data for the aqueduct inflow during 2006-2007.
4 Range of observed data in surface runoff into San Vicente Reservoir during 2006-2007 from Kimball Creek, San Vicente Creek, Barona Creek, Tool Road Creek, and Aqueduct Creek.
5 Ammonia is in the form of ionized ammonia (NH_4^+-N).

Table 3 summarizes the nutrient and biostimulation results for the modeled scenarios. As shown in Table 3, chlorophyll-α concentrations are projected to be less with the expanded reservoir and the proposed purified water inflow than under current conditions. The simulations predict that reservoir water clarity under the Base Case (expanded reservoir and purified water inflow) is projected to be improved compared to existing conditions.

Table 3
Summary of Nutrient and Biostimulation Model Results[1,2]

Model Scenario	Average Annual Number of Days Hypolimnion is Anoxic[2,3,4]	Average Chlorophyll-α Concentration in Surface Waters[,2,4]	Average Secchi Depth[2,4]
Existing Case[5] (existing reservoir capacity and no purified water)	189 days (52%)	5.8 µg/l	3.2 meters
Expanded Reservoir with no purified water[6]	207 days (57%)	3.1 µg/l	4.8 meters
Base Case[6] (expanded reservoir with purified water inflow)	215 days (59%)	3.7 µg/l	4.3 meters

1 ELCOM/CAEDYM model results presented by FSI (2012a).
2 Based on two-year simulation using hydrologic data for 2006 and 2007.
3 Number of days in which the average hypolimnion dissolved oxygen concentration is less than 0.5 mg/l.
4 Average annual value for the two-year simulation.
5 Initial reservoir volume of 64,000 AF in year 1 and 64,000 AF in year 2.
6 Initial reservoir volume of 155,000 AF in years 1 and 2.

Coordination with CDPH. Regulatory coordination was another key element of the Demonstration Project evaluation. The City engaged CDPH staff in establishing the Demonstration Project work plan. CDPH staff have attended IAP workshops and have been active participants in working group meetings. Through these venues, CDPH has reviewed reservoir technical studies and purified water treatment results.

CDPH has indicated that requirements for a full-scale project would be, in part, based on providing a level of public health protection equivalent to that provided within CDPH's 2011 "Draft Regulations for Groundwater Replenishment with Recycled Water" (Groundwater Recharge Regulations). (CDPH, 2011) Based on guidance provided by CDPH to date, the following elements are expected to provide the framework for CDPH regulation of a full-scale project at San Vicente Reservoir:

- Enhanced Wastewater Source Control
- Pathogenic Microorganism Control
- Control of Nitrogen Compounds
- Regulated Contaminants, Additional Chemicals, and Contaminant Monitoring, and Total Organic Carbon Control

- Reliability and Redundancy
- Monitoring and Response Plan
    - AWP Facility Integrity Monitoring
    - San Vicente Reservoir Retention and Blending
    - Mitigation of an AWP Facility system failure by San Vicente Reservoir

In accordance with provisions within Senate Bill 918, CDPH is required to adopt uniform water recycling criteria for indirect potable reuse (reservoir augmentation) by December 31, 2016, provided that an expert panel (convened pursuant to the bill) finds that the criteria would adequately protect public health. In advance of adopting uniform criteria, CDPH can review reservoir augmentation projects on a case-by-case basis. In March 2012, the City submitted a draft proposed reservoir augmentation project proposal and request for conceptual approval to CDPH. CDPH is currently reviewing the draft submittal. (City of San Diego, 2012)

Coordination with Regional Board. The City has engaged Regional Board staff throughout the Demonstration Project feasibility evaluation. This coordination has included a number of project-specific meetings held at the Regional Board office and Regional Board staff attendance at IAP sessions.

The most recent City meeting with Regional Board staff focused on (1) Regional Board interpretation of Basin Plan nutrient water quality objectives and (2) potential implications of the CWA Section 303(d) impaired water listings for San Vicente Reservoir. This report is submitted as a follow-up to the most recent meeting of June 18, 2012, and addresses pathways for demonstrating compliance with Regional Board requirements.

Public Education and Outreach. The Demonstration Project effort also included a public education and outreach plan that included developing:

- a communication plan,
- speakers bureau,
- multi-language information materials and brochures,
- stakeholder interviews and research surveys,
- videos, electronic updates and a website, and
- AWP Facility tours.

Outreach efforts have garnered positive coverage both locally and nationally. On January 23, 2011, the *San Diego Union-Tribune* published an editorial declaring that the newspaper editorial board accepts the science behind water purification technology and encourages the rest of San Diego to do the same. National media coverage has included a front page cover story in *USA Today* (March 3, 2011) and an article on the cover page of the *New York Times* (February 10, 2012).

Demonstration Project Report. The City Public Utilities Department is currently developing a project report that summarizes the results of the Demonstration Project feasibility effort. Submittal of the report to the City of San Diego City Council is scheduled for late 2012.

Section 3 Full-Scale Project Concept

The concept for a full-scale project at San Vicente Reservoir is based on guidance from CDPH and the IAP. The project concept components are illustrated in Figure 6 (below). Figure 7 (page 13) summarizes the primary roles and key public health protection features of the project elements.

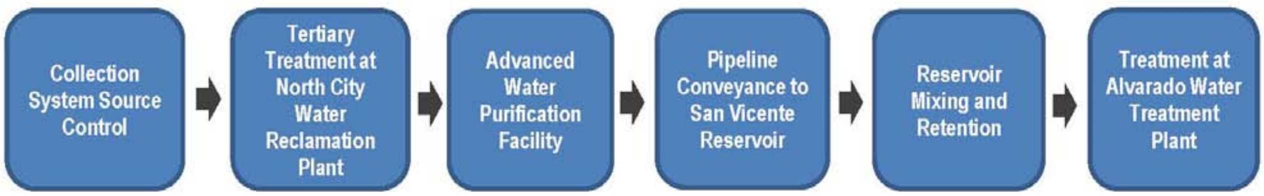


Figure 6
Components of the Full-Scale Project

Collection System Source Control. The City maintains a comprehensive industrial pretreatment and source control program approved by EPA to control waste discharges from industrial sources into the wastewater collection system. The main components of the program are:

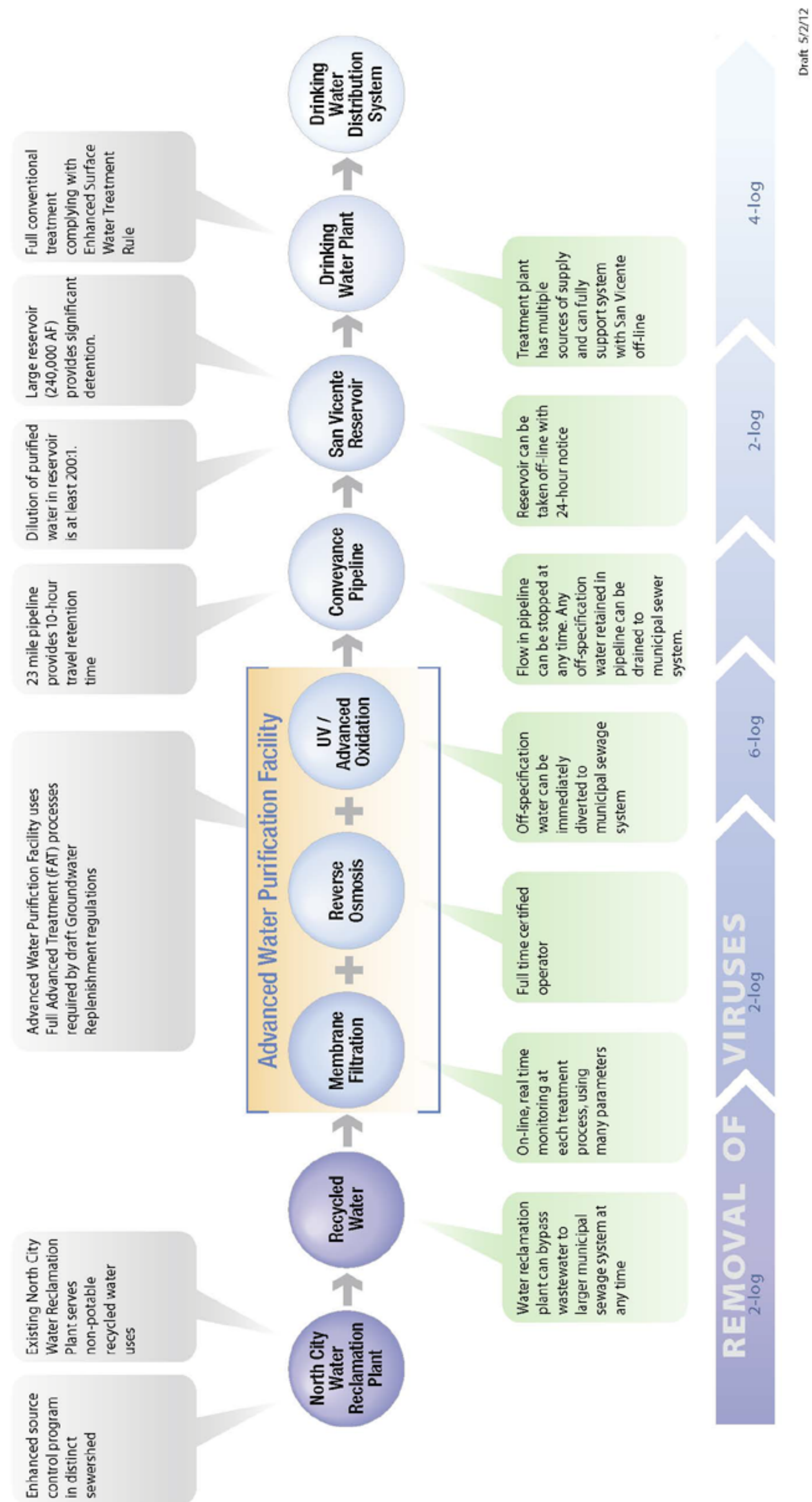
- evaluating, issuing and administering industrial user permits,
- establishing sampling, reporting, record keeping, and notification requirements for industrial dischargers,
- performing compliance inspections and compliance monitoring, and
- enforcing permit requirements, requiring corrective actions, and authorizing penalties for discharge violations.

As part of the City of San Diego NPDES permit and 301(h) waiver for the Point Loma Wastewater Treatment Plant (Point Loma), the City is required to implement an Urban Area Pretreatment Program per Title 40, Section 125.65 of the *Code of Federal Regulations* (40 CFR 125.65).

Regulations established in 40 CFR 125.65 require 301(h) dischargers to demonstrate that the combination of enhanced source control and wastewater treatment provides the equivalent to secondary treatment for the removal of toxic constituents. The Urban Area Pretreatment Program requirements of 40 CFR 125.65 have been incorporated into the Point Loma NPDES permit adopted by the Regional Board and EPA (Order No. R9-2009-0001, NPDES CA0107409).

Figure 7

Multiple Treatment Barriers for the Full-Scale Project



The City's source control program organizes industrial users into 27 sewersheds. Four of these sewersheds are tributary to the NCWRP, where the full-scale AWP Facility will be located. The City's pretreatment program currently regulates 198 industries within these four sewersheds. A total of 102 of these industrial users are research and development companies. The remaining 96 industries cover 49 different industry types including car washes, gas stations, electronic equipment manufacturers and veterinary services.

North City Water Reclamation Plant. The NCWRP is a 30-mgd water reclamation plant serving roughly 7,500 AFY of recycled water to irrigation and industrial customers throughout the North City area. NCWRP operates as a scalping plant, receiving flows that would otherwise be treated at Point Loma. Biosolids are sent offsite for processing, with no return flow to the NCWRP. NCWRP treatment processes include:

- headworks and barscreens,
- aerated grit removal,
- primary sedimentation,
- secondary aeration with aerated and anoxic selector zones to achieve full nitrification and partial denitrification,
- secondary clarification, and
- deep bed anthracite tertiary filtration.

NCWRP recycled water used for irrigation use undergoes chlorination, but NCWRP recycled water flows directed to the AWP Facility project would be diverted prior to chlorine disinfection to control formation of chlorination byproducts. NCWRP also includes flow equalization, which allows for near-constant flowrates through the secondary treatment facilities, maximizing the stability of the plant's biological processes.

Advanced Water Purification Facility. As part of a full-scale project, NCRWRP tertiary treated recycled water would serve as an influent flow to the proposed 18 mgd AWP Facility. AWP Facility treatment processes would include:

<u>Membrane Filtration</u>: Tertiary effluent will flow to a low pressure membrane filtration process consisting of either microfiltration or ultra-filtration. In addition to minimizing RO fouling by removing colloidal and suspended particles, low pressure membranes provide a barrier to a wide array of microbes and will assist the project in meeting microbial removal targets.

<u>Reverse Osmosis</u>: All AWP Facility flow will undergo RO treatment, the primary barrier to organic chemicals. The RO system will meet applicable salt rejection specifications established by CDPH. Concentrated brine from the RO treatment will be discharged back into the sewer for treatment at Point Loma.

<u>Disinfection/Photolysis/Advanced Oxidation:</u> Permeate from the RO process would undergo disinfection and advanced oxidation. High intensity UV irradiation provides both the primary disinfection step in the AWP Facility and photolysis of certain classes of organic chemicals such as

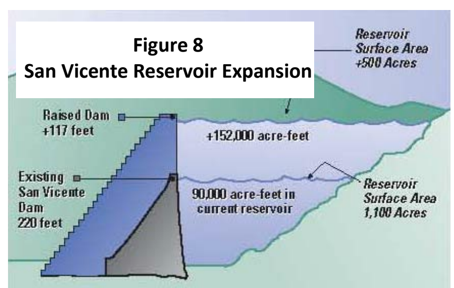
NDMA. With the addition of hydrogen peroxide, high intensity UV provides an additional barrier (to RO) for oxidizable contaminants. The advanced oxidation process will be designed to adhere to criteria established in the Draft CDPH Groundwater Recharge Regulations.

A flow analysis study conducted as part of the Demonstration Project evaluated source water availability due to NCWRP's seasonal irrigation demands, and identified 18 mgd as the optimum capacity for a full-scale AWP Facility. The 18 mgd AWP Facility would annually produce approximately 15,000 AFY of purified water.

Conveyance to San Vicente Reservoir. Purified recycled water will be pumped through a 23-mile, 36-inch diameter pipeline to San Vicente Reservoir. The static lift from the purified water pump station to San Vicente Reservoir is approximately 445 feet. A flow control structure at the reservoir outlet and surge control facilities will be required to optimize flow conditions in the pipeline.

The travel time of the purified water from the AWP Facility to the reservoir would be approximately 10 hours, based on a maximum pumping rate of 18 mgd. In case of an operation malfunction at the AWP Facility, this would allow time to interrupt conveyance before any affected water reaches the reservoir. The conveyance system will include features allowing the entire volume of the pipeline to be drained to sanitary sewer.

Reservoir Storage. Under the full-scale project, approximately 15,000 AFY of purified water would be introduced into San Vicente Reservoir. The purified water inflow would augment existing reservoir inflows (aqueduct inflow, local runoff, and transfers from Sutherland Reservoir) and replace a commensurate amount of imported water that would otherwise be introduced into the reservoir.



San Vicente dam and reservoir are owned and operated by the City of San Diego Public Utilities Department. San Vicente Reservoir impounds local runoff from its 75 square-mile catchment, stores water transferred from Sutherland Reservoir, and stores water imported from the Colorado River and northern California. The reservoir's principal use is for municipal water supply. The reservoir also supports limited recreational activities including boating, fishing, and water skiing, although these activities have been suspended during construction of facilities to raise San Vicente Dam.

While San Vicente Reservoir is being expanded to a capacity exceeding 240,000 AF, the additional capacity is to be primarily utilized for emergency storage purposes. During non-emergency conditions, annual inflows to and withdrawals from the reservoir are not expected to be significantly different from historic operations. It is anticipated that the expanded San Vicente Reservoir will be substantially filled prior to initiation of a full-scale project.

The amount of imported water introduced to San Vicente Reservoir depends on water availability, water price, and the operational needs of the City of San Diego and San Diego County Water Authority, but has typically averaged approximately 20,000 to 30,000 AFY. Runoff inflow the reservoir varies significantly depending on hydrologic conditions, but typically averages approximately 4,500 AFY, a total roughly equivalent to the annual evaporation from the reservoir. (FSI, 2010) Thus, under typical conditions, a 15,000 AFY purified water flow would represent roughly half of the annual San Vicente Reservoir inflow. As demonstrated by the Demonstration Project Limnology Studies (see pages 4 - 8), a 15,000 AFY purified water inflow into San Vicente Reservoir would result in significant reservoir detention.

San Vicente Dam has overflowed on only a few occasions since its construction in 1943; the most recent spill occurred in 1995. San Vicente Reservoir overflows are not projected to occur once the reservoir is expanded. As a result, is not projected that any waters (imported or purified) introduced into the expanded reservoir will be released to downstream water bodies (San Vicente Creek and the San Diego River).

Potable Water Treatment. Water withdrawn from San Vicente Reservoir would undergo conventional potable water treatment prior to conveyance to potable water customers. Under normal operations, water from San Vicente Reservoir is conveyed to the City of San Diego Alvarado Water Treatment Plant which serves the central portion of San Diego.

Through agreements with the San Diego County Water Authority, a portion of San Vicente Reservoir's storage may be used in emergency and extended drought conditions to supply water treatment plants serving the southern half of San Diego County. In an emergency event, other water treatment plants that could be supplied from San Vicente Reservoir include the City's Miramar and Otay Water Treatment Plants, Helix Water District's Levy Treatment Plant, the Sweetwater Authority's Purdue Water Treatment Plant, and the Santa Fe Irrigation's Districts Badger Water Treatment Plant.

Section 4 Regional Board Support and Guidance

Regional Board Resolution of Support. On October 12, 2011, the Regional Board adopted Resolution No. R9-2011-0069, which documents the Regional Board's support of the City's proposed reservoir augmentation project at San Vicente Reservoir, and sets forth the Regional Board's proposed means of regulating the project. Resolution No. R9-2011-0069 states that:

> ***NOW THEREFORE, BE IT RESOLVED THAT**, the San Diego Regional Water Quality Control Board:*
>
> 1. *Supports the efforts to develop the Reservoir Augmentation Project at the San Vicente Reservoir as a means to reduce reliance on imported water, increase the use of recycled water, and to implement goals in California Water Code section 13510 and the 2008-2012 Strategic Plan Update for the Water Boards.*

2. *In accordance with implementation provisions of the Basin Plan, the San Diego Water Board will regulate San Diego Region recycled water reservoir augmentation projects through the issuance of project-specific NPDES Permits.*
3. *Reservoir augmentation NPDES permits issued by the San Diego Water Board will incorporate requirements established and the provisions recommended by California Department of Public Health.*

City and Regional Board Coordination. As part of the Demonstration Project, City of San Diego and Regional Board staff held a series of coordinating meetings to discuss Demonstration Project progress and issues associated with Regional Board issuance of a NPDES permit for a full-scale project at San Vicente Reservoir.

Should the City Council choose to move forward with a full-scale project at San Vicente Reservoir, Regional Board staff indicate that the City will be required to submit a "Report of Waste Discharge" in application for a NPDES permit. As part of the Demonstration Project coordination effort, City and Regional Board staff have discussed information needs for the Report of Waste Discharge, which will include:

- describing the proposed full-scale project and purified water quality,
- evaluating water quality effects on San Vicente Reservoir,
- demonstrating compliance with Basin Plan water quality standards,
- demonstrating compliance with *California Toxics Rule* standards, and
- demonstrating compliance with CDPH requirements.

Pending Regional Board Procedural Decisions. While Resolution No. R9-2011-0069 confirms Regional Board support for the reservoir augmentation concept, Regional Board staff indicate that they are still working to finalize staff recommendations on two key procedural issues that will influence the pathway and schedule for securing a NPDES permit for a full-scale reservoir augmentation project at San Vicente Reservoir. These two key procedural questions include:

1. Prior to the Regional Board's consideration of a NPDES permit for reservoir augmentation at San Vicente Reservoir, will the Regional Board, State Board, and EPA need to take actions to modify the CWA Section 303(d) impaired water list for San Vicente Reservoir?
2. Prior to the Regional Board's consideration of a NPDES permit for reservoir augmentation at San Vicente Reservoir, will the Regional Board, State Board, and EPA need to modify any requirements within the Regional Board's Basin Plan?

Regional Board staff indicate that they are seeking guidance from EPA and the State Board in determining the answers to these questions.

Section 5 Basin Plan Compliance

As indicated by Regional Board staff, a key element of a NPDES application for a full-scale project at San Vicente Reservoir involves demonstrating compliance with Basin Plan water quality standards. How the Regional Board, State Board, and EPA resolve the two above-noted procedural questions will, in part, depend on how the agencies interpret and apply existing Basin Plan water quality standards to the proposed project. This section summarizes key Basin Plan compliance issues for a full-scale project at San Vicente Reservoir.

Basin Plan Overview. The Basin Plan establishes water quality concentration objectives to protect designated beneficial uses of San Vicente Reservoir. The Basin Plan surface water quality objectives have been approved by EPA as federal water quality standards that are subject to regulation and enforcement under provisions of the CWA. Basin Plan water quality objectives within San Vicente Reservoir, in part, are established for:

- mineral parameters,
- CDPH drinking water parameters, and
- phosphorus and nitrogen.

Mineral Parameters. The Basin Plan establishes numerical mineral concentration objectives for San Vicente Reservoir for total dissolved solids, chloride, sulfate, percent sodium, iron, manganese, boron, and fluoride. Because the purified water supply will undergo full RO treatment, the purified water supply is projected to contain concentrations of these mineral constituents that are significantly below the Basin Plan water quality objectives. Concentrations of minerals in the purified water will also be significantly below existing concentrations in both the imported water and local runoff inflow to San Vicente Reservoir. As a result, the proposed project will improve the mineral quality of water in the reservoir, and compliance with Basin Plan mineral parameters will not be an issue of concern for a full-scale project at San Vicente Reservoir.

CDPH Drinking Water Parameters. The Basin Plan incorporates State of California drinking water MCLs as surface water quality objectives. AWP Facility treatment processes have been selected (and tested during the Demonstration Project) to ensure that a full-scale project will comply with the MCLs. As noted, the City has submitted a draft project proposal to CDPH that documents projected compliance with CDPH requirements and presents the result of testing at the AWP Facility to document compliance with CDPH MCLs.

Phosphorus and Nitrogen. The Basin Plan establishes the following narrative and numerical water quality objectives to prevent adverse biostimulatory effects in surface waters:

> *Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total Phosphorous (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisances in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be*

exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P = 10:1 shall be used.

Phosphorus. As shown in Table 2 (see page 9), the AWP Facility treatment processes achieved near total removal of phosphorus. Based on the AWP Facility treatment results, purified water from a full-scale project at San Vicente Reservoir is projected to comply with the Basin Plan numerical water quality objectives for total phosphorus by a significant margin.

Nitrogen. As part of the full-scale project, existing NCWRP operations and facilities would be optimized for nitrogen removal. Additional nitrogen removal would occur through membrane filtration and RO treatment. Despite this advanced degree of nitrogen removal, the purified water supply is projected (see Table 2 on page 9) to contain total nitrogen concentrations on the order of 0.8 mg/l. The purified water is projected to be highly phosphorus limited, with a N:P ratio on the order of 160:1 or more.

The Basin Plan objective for total nitrogen has been subject to varying interpretation over the years as to whether the objective represents a numerical objective or narrative objective. The Basin Plan establishes numerical concentration objectives for phosphorus and states that "analogous thresholds for nitrogen have not been established". At the same time, however, the Basin Plan directs that natural nitrogen to phosphorus (N:P) ratios are to be determined through surveillance and upheld. Current Regional Board interpretation of the Basin Plan nitrogen objective, as presented to the City during a June 18, 2012 meeting, is that the Basin Plan surface water nitrogen objective consists of (1) a narrative objective prohibiting biostimulation effects that adversely impact beneficial uses, and (2) a numerical objective based on upholding "natural" N:P ratios.

The Basin Plan objective that natural N:P ratios be identified and upheld is derived from water quality criteria published by EPA (1976) in *Quality Criteria for Water* (Red Book). The Red Book N:P guidance recognized that biostimulation is limited by the availability of the least available nutrient. The availability of phosphorus limits biostimulation growth when N:P ratios are greater than approximately 10:1, while the availability of nitrogen limits biostimulation growth when N:P ratios are less than approximately 10:1. In the absence of data on whether nitrogen or phosphorus is limiting biostimulation, the Basin Plan presents guidance that a 10:1 N:P ratio should be used for assessing conformance with the narrative biostimulation objective.

Nitrogen concentration effluent limits established by the Regional Board in a reservoir augmentation NPDES permit will, in part, be determined by how the Regional Board chooses to interpret the "upholding natural N:P ratios" Basin Plan objective. If the Regional Board were to apply a 10:1 N:P ratio in establishing standards for introducing purified water to San Vicente Reservoir, the Board might require the purified water to achieve a total nitrogen concentration limit of 0.25 mg/l to 0.5 mg/l. In this event (see Section 5), modification of the Basin Plan nitrogen objective could be required to support implementation of a full-scale project at San Vicente Reservoir.

As a result of the uncertainty on how the Basin Plan nitrogen objective translates to NPDES permit limits, additional Regional Board guidance on Basin Plan nitrogen and N:P compliance will be required to:

- identify probable purified water total nitrogen effluent limits that would be recommended by the Regional Board in the NPDES permit, and
- determine whether or not modification of the Basin Plan total nitrogen objectives for San Vicente Reservoir will be required prior to Regional Board consideration of a NPDES permit for a full-scale project at San Vicente Reservoir.

Dissolved Oxygen. The Basin Plan designated San Vicente Reservoir as supporting both warm water habitat and cold water habitat. The Basin Plan requires that dissolved oxygen (DO) concentrations be maintained at 5.0 mg/l for warm water habitats, and 6.0 mg/l or more for cold water habitats. The Basin Plan also requires that mean annual DO concentrations be maintained at 7.0 mg/l or more.

The purified water would contain high concentrations of DO, and would not contain any discernible quality of oxygen-demanding material. Further, reservoir modeling conducted as part of the Limnology Study indicates no significant differences in DO concentrations within the epilimnion (where the purified water would be introduced) between the purified water and no purified water scenarios. (FSI, 2012a)

Despite these facts, however, a demonstration of compliance with the Basin Plan DO requirement will depend on Regional Board interpretation of the Basin Plan. The existing Basin Plan DO objectives are not based on and do not take into account thermal stratification in reservoirs. Once reservoirs stratify, no source of dissolved oxygen is available to the hypolimnion, and (in the absence of artificial aeration) hypolimnion DO concentrations naturally fall below the Basin Plan objectives in all thermally stratified reservoirs. As a result, compliance with the Basin Plan dissolved oxygen concentration objectives in the hypolimnion are not sustainable under natural conditions in San Vicente Reservoir or any other thermally stratified reservoir.

Demonstrating this natural effect, reservoir modeling conducted as part of the Demonstration Project Limnology Study (see Table 3 on page 10) indicates that hypolimnetic anoxia (DO concentrations of less than 0.5 mg/l) will occur slightly more than half of the year as a result of thermal stratification, regardless of whether or not reservoir augmentation is implemented.

Because the existing Basin Plan dissolved oxygen concentrations are inconsistent with conditions that naturally occur within stratified reservoirs, additional Regional Board guidance on Basin Plan DO compliance will be required to:

assess probable dissolved oxygen requirements that would be recommended by the Regional Board in the NPDES permit to implement the Basin Plan DO objectives, and determine whether or not modification of the Basin Plan dissolved oxygen objectives for San Vicente Reservoir will be required prior to Regional Board consideration of a NPDES permit for a full-scale project at San Vicente Reservoir.

Section 6 California Toxics Rule Compliance

California Toxic Rule. EPA in 2000 promulgated the *California Toxics Rule*, or CTR (40 CFR 131), which establishes water quality standards for inland surface waters of California. The CTR establishes the following standards for discharges to inland surface waters:

- maximum (acute) concentration standards for toxic inorganic and organic constituents for the protection of freshwater aquatic habitat,
- continuous (chronic) standards for toxic inorganic and organic constituents for the protection of freshwater aquatic habitat, and
- standards for the protection of human health (consumption of organisms and consumption of water plus organisms).

Projected CTR Compliance. Data from the AWP Facility indicate that CTR standards for metals and cyanide are not projected to represent a compliance concern for a full-scale project, as (1) the NCWRP tertiary effluent contains low concentrations of these compounds, and (2) RO treatment to be provided as part of the AWP Facility is effective in removing such inorganic compounds.

Figure 9
AWP Facility at NCWRP

For these same reasons, the Demonstration Project data also has not indicated any toxic organic constituent which appears to represent a compliance concern. (It should be noted that bromodichloromethane was detected in one AWP Facility sample at a level above the CTR limit, but bromodichloromethane was normally below detection limits and this single sample result is considered an anomaly.) While no CTR compliance issues have been identified through Demonstration Project monitoring, CTR standards for the protection of public health include several standards that are significantly more stringent than can be reliably analyzed using available detection technology and detection limits. CTR-regulated compounds that include standards more stringent than available detection limits include:

- chlorinated pesticides such as DDT, Aldrin, Dieldrin, Heptachlor,
- polychlorinated biphenyls (PCBs),
- poly-aromatic hydrocarbons (PAHs), and
- N-nitrosodimethylamine (NDMA).

No reason appears to exist for chlorinated pesticides, PCBs, and PAHs to appear in the NCWRP effluent. Additionally, RO typically achieves significant removal of these compounds. The City's Demonstration Project testing included special focus on NDMA, as:

- NDMA is occasionally present in Southern California recycled water supplies,
- typical RO removal efficiencies for NDMA are on the order of 50 percent, and
- the CTR standard for NDMA is 0.00069 µg/l.

Despite these original concerns, however, existing Demonstration Project purified water data do not indicate that NDMA will represent a compliance issue. If the City chooses to move forward with a full-scale project at San Vicente Reservoir, however, the City's NPDES Report of Waste Discharge will reassess NDMA to determine if implementation of additional NDMA compliance measures are appropriate.

Section 7 Pathways for Demonstrating Regulatory Compliance

Implementation Approach. The City has submitted a preliminary project proposal to CDPH seeking conceptual approval for a full-scale reservoir augmentation project at San Vicente Reservoir. The Public Utilities Department is also scheduled to submit a feasibility report to the City Council in late autumn 2012.

Should the City Council choose to move forward with a full-scale project at San Vicente Reservoir, the City will initiate work to develop additional information required to support the design, environmental review, and regulatory permitting for the project. Such additional work would support:

- ongoing coordination with CDPH in support of modifying the City's CDPH water supply operating permit,
- assessing compliance with provisions of the California Environmental Quality Act (CEQA), and
- coordination with the Regional Board to assess Basin Plan compliance issues and information needs for submitting a Report of Waste Discharge to the Regional Board in application for a NPDES permit for a full-scale project.

Basin Plan Concentration Standards. The Basin Plan provides clear implementation guidance on the development of NPDES effluent standards for mineral constituents, drinking water MCLs, and total phosphorus. As noted in Section 6, available purified water data demonstrate compliance with Basin Plan water quality objectives. For these constituents, the City proposes the following pathway for demonstrating compliance of a full-scale project:

- present the results of Demonstration Project monitoring data and demonstrate that the AWP Facility purified water complies with applicable Basin Plan objectives, and
- submit the results of the comparison in a Report of Waste Discharge submitted in application for NPDES requirements for a full-scale project.

CTR Standards. Figure 10 schematically presents the process the City will utilize to demonstrate compliance with CTR standards. As noted in Section 6, available Demonstration Project data indicate compliance with applicable CTR standards for toxic organic and inorganic constituents without the need for an assigned mixing zone or dilution credit.

In the event additional data indicate a potential need for the consideration of a CTR mixing zone, the City will conduct studies to assess mixing zone hydraulics, dilution, and concentrations of CTR constituents at the edge of the mixing zone. As part of the dilution studies, the fate (e.g. half-life) of discharged constituents would be evaluated in order to assess re-entrainment effects.

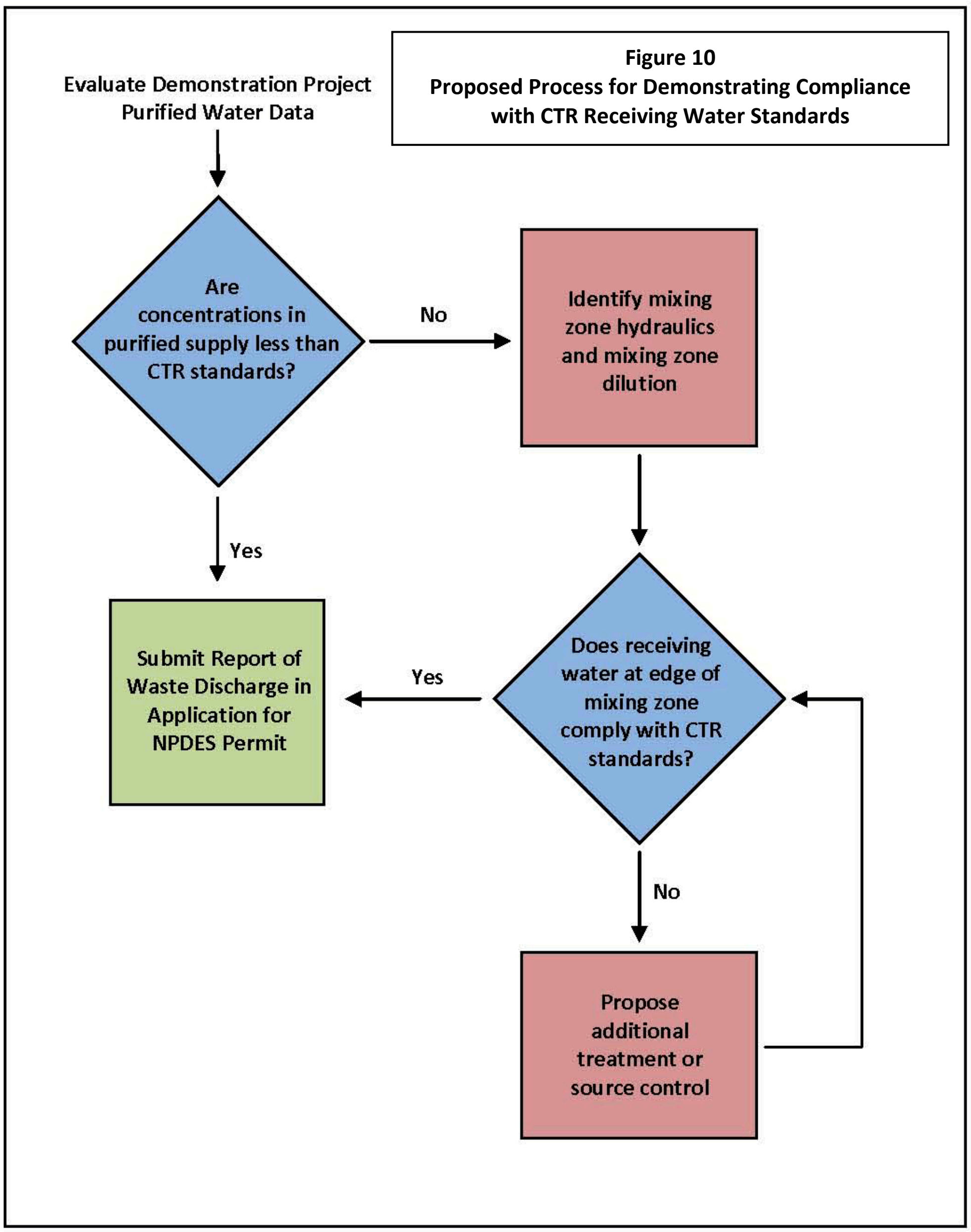


Figure 10
Proposed Process for Demonstrating Compliance with CTR Receiving Water Standards

Total Nitrogen and N:P Ratios. Additional coordination with Regional Board staff will be required to evaluate the appropriate pathway for regulatory approval of with respect to total nitrogen. Regional Board guidance will be required to address whether (1) modification of the Basin Plan or (2) modification of the CWA Section 303(d) impaired water body list will be required prior to Regional Board consideration of a NPDES permit for full-scale project at San Vicente Reservoir.

Figure 11 (page 25) presents the regulatory pathways for addressing issues associated with total nitrogen in San Vicente Reservoir. As shown in Figure 11, if the Regional Board, EPA, and State Board determine that no modifications of the 303(d) list or Basin Plan are required to support a full-scale project at San Vicente Reservoir, the City could directly move forward (if approved by the City Council) with preparing:

- a Report of Waste Discharge in application for a full-scale project at San Vicente Reservoir, and
- an Environmental Impact Report (EIR) that assesses compliance with provisions of CEQA.

While CEQA does not apply to the issuance of NPDES permits, the City recognizes the Regional Board preference for applicants to utilize the normal CEQA compliance process for assessing construction and operation impacts prior to the Regional Board's processing of a NPDES permit. Accordingly, the City anticipates completing an EIR and demonstrating compliance with CEQA in advance of Regional Board consideration of a NPDES permit for the full-scale project at San Vicente Reservoir.

303(d) Implications. One of the key factors that will dictate the pathway for regulatory approval of a full-scale project at San Vicente will be how regulators choose to interpret requirements established within Section 303(d) of the CWA. It is the City's understanding that the Regional Board has yet to determine whether revision of the existing CWA Section 303(d) impaired water list is required prior to issuing a NPDES permit for a full-scale project at San Vicente Reservoir.

In accordance with requirements established within CWA Section 303(d), the Regional Board identifies surface waters not complying with applicable water quality standards (impaired waters), and establishes priorities and schedules for the preparation of Total Daily Maximum Load (TMDL) and waste load allocations required to attain and maintain the standards. In 2008, the Regional Board added San Vicente Reservoir to the 303(d) list as a Category 5 (TMDL-required) impaired water body, and scheduled a TMDL for year 2021 to address the non-compliance.

The Regional Board's 2008 rationale for the 303(d) listing of San Vicente Reservoir for total nitrogen was based on the use of a "default" N:P ratio of 10:1 and data indicating that San Vicente Reservoir total nitrogen concentrations routinely exceeded 0.25 mg/l. In presenting the justification for the San Vicente Reservoir 303(d) listing, the Regional Board did not address or identify San Vicente Reservoir "natural" N:P ratios. Additionally, the 303(d) listing for San Vicente Reservoir only considered historic loads associated with the pre-expansion reservoir.

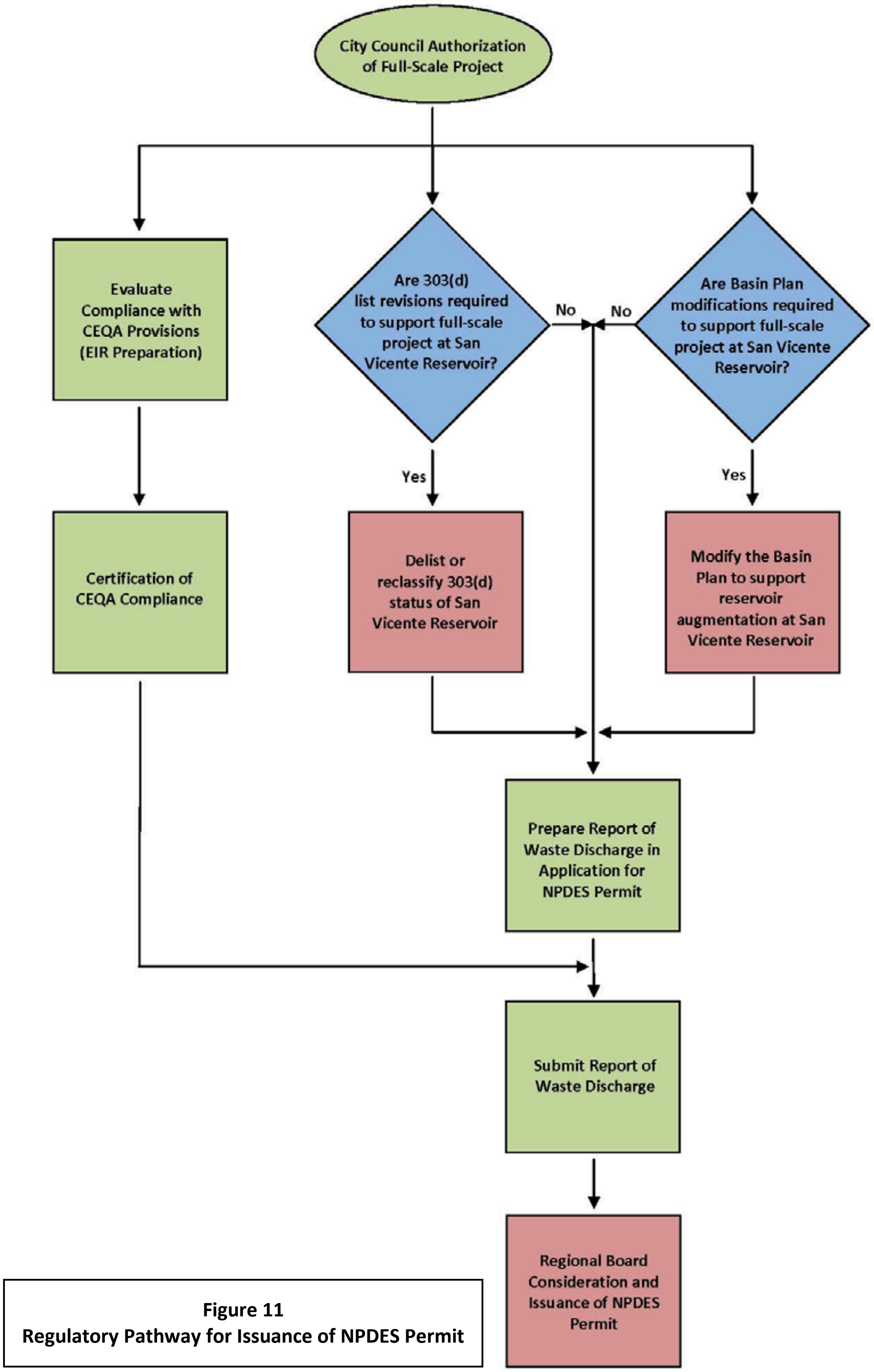


Figure 11
Regulatory Pathway for Issuance of NPDES Permit

Regional Board guidance is required to address if and how the 2008 303(d) impaired water listing of the historic San Vicente Reservoir applies to the expanded San Vicente Reservoir, and whether or not the existing 303(d) listings properly addressed San Vicente Reservoir N:P ratios. Additional Regional Board guidance will be required to address how the 303(d) listing of San Vicente Reservoir influences how the Regional Board can establish NPDES concentration limits for total nitrogen.

The City understands that the EPA and Regional Board are currently assessing implications of a 2007 ruling by the U.S. Court of Appeals for the Ninth Circuit that addressed a case involving issuance of a NPDES permit for a discharge to a 303(d) listed water. This Court of Appeals ruling appeared to place restrictions on when and how NPDES permits can be issued for discharges to 303(d) impaired waters. EPA has not yet issued guidance on how to interpret and apply this ruling. The regulatory pathway to project approval will, in part, depend on the direction of this guidance, and may include the need to:

- delist San Vicente Reservoir as being impaired for total nitrogen,
- revise the 303(d) listing to address identifying and upholding "natural" N:P ratios, or
- modify the San Vicente 303(d) listing to a lesser category (e.g. Category 4, where no TMDL is required).

Interpretation of Basin Plan N:P Objective. Regional Board guidance (see Figure 11) is also required to determine whether or not modification of the Basin Plan is required prior to Regional Board consideration of a NPDES permit for a full-scale project at San Vicente Reservoir.

As noted, the Basin Plan does not establish "analogous thresholds" for nitrogen, but requires that natural N:P ratios be identified and upheld. How the Regional Board chooses to interpret this requirement will influence the City's pathway to regulatory approval. Under the proposed project concept, approximately 15,000 AFY of imported water would be replaced by purified water that contains extremely low concentrations of phosphorus (resulting in N:P ratios on the order of 160:1 or more). Such a consistent purified water flow would allow the reservoir epilimnion (which comprises the euphotic portion of the reservoir where photosynthesis can occur) to be maintained in a phosphorus-limited mode (high N:P ratios). In minimizing the potential for biostimulation by upholding this high N:P ratio, Regional Board could be justified in establishing an attainable purified water NPDES effluent total nitrogen limit (e.g., a limit on the order of 1.0 mg/l). Under this interpretation, modification of the Basin Plan total nitrogen objective may not be necessary in order for the Regional Board to implement attainable effluent nitrogen limits for a full-scale project at San Vicente Reservoir. Additionally, an argument can be made that no basis exists for identifying "natural" N:P ratios in the historic San Vicente Reservoir because:

- the reservoir is being replaced by a larger reservoir which will be subject to a different set of natural conditions, and
- historic N:P ratios in the reservoir have been largely a function of how the reservoir is operated and which source of imported water (e.g. State Project Water or Colorado River) is being delivered to the reservoir, , as opposed to "natural" conditions.

Dissolved Oxygen. As described in Section 6, the Basin Plan implements a "one-size-fits-all" approach in applying a fixed set of dissolved oxygen concentrations to all San Diego Region surface waters. Basin Plan dissolved oxygen objectives do not take into account thermal stratification conditions in San Diego Region reservoirs, and are not physically sustainable in the hypolimnion under natural conditions once a thermocline has been established. The Regional Board has not addressed this Basin Plan inconsistency to date, and the reservoir augmentation project at San Vicente Reservoir would represent the first circumstance since the 1976 adoption of the Basin Plan in which the Regional Board is asked to consider NPDES requirements for a discharge to a thermally stratified reservoir.

Coordination with Regional Board staff will be required to assess implications of Basin Plan dissolved oxygen concentrations on a full-scale project at San Vicente Reservoir. In the event that the Regional Board determines that Basin Plan modifications are required to support the reservoir augmentation concept, such Basin Plan modifications (see Figure 11 on page 25) would be required in advance of (or in parallel with) developing the NPDES Report of Waste Discharge.

Section 8 Implementation and City-Preferred Pathway

Implementation Schedule for Preferred Pathway. As documented herein, the full-scale project will comply with all CDPH requirements and conform to applicable Basin Plan mineral standards, drinking water standards, and CTR standards. Additional Regional Board guidance, however, is required regarding whether or not:

- Revisions in the CWA Section 303(d) impaired water listings for San Vicente Reservoir are required prior to Regional Board issuance of a NPDES permit for the project, and
- Modifications in the Basin Plan are required prior to Regional Board issuance of a NPDES permit for the project.

The City believes that it is both feasible and appropriate for the Regional Board to consider and issue a NPDES permit for a full-scale project at San Vicente Reservoir without revisions to either the 303(d) list or Basin Plan. The pathway for project approval (see Figure 11) is straight-forward if the Regional Board and EPA agree with this interpretation.

Table 4 (page 28) presents a preliminary implementation time line for issuance of a NPDES permit for a full-scale project if no Basin Plan or 303(d) list modifications are required. Virtually all of the technical information required for preparation of a Report of Waste Discharge has been developed as part of the Demonstration Project. As a result, the City could prepare the requisite NPDES application documents concurrent with the City's CEQA compliance work. Under this scenario, the City could submit a NPDES application to the Regional Board immediately upon certification of CEQA compliance for the full-scale project. It is anticipated that the Regional Board should be able to issue a NPDES permit (and EPA approve the NPDES permit) within 12 months of the date the NPDES application is submitted.

Table 4
NPDES Permit Implementation Schedule
If No 303(d) List or Basin Plan Modifications are Required

Task	Elapsed Time After City Council Approves and Funds the Full-Scale Project at San Vicente Reservoir											
	Year 1				Year 2				Year 3			
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
City Approvals and CEQA Certification												
City Council approval of funding for full-scale project at San Vicente Reservoir	●											
CEQA consultant selection; draft EIR preparation; public review and comment	■	■	■	■	■	■	■	■				
City Council certification of CEQA compliance for full-scale project								●				
NPDES Permit Application and Approval												
City coordination with Regional Board staff and CDPH	■	■	■	■	■	■	■	■	■	■		
City selection of technical consultant; contract issuance and notice to proceed					■	■						
Preparation of draft and revised draft Reports of Waste Discharge for full-scale project							■	■				
City submits Report of Waste Discharge to Regional Board								●				
Regional Board staff reviews Report of Waste Discharge and coordinates with City for any additional required data									■	■	■	
Regional Board staff prepares Tentative NPDES permit; public comment period											■	
Regional Board consideration and approval of NPDES permit for full-scale project											●	
EPA approval of NPDES permit												●

Implementation Pathway if 303(d) List Revisions are Required. The City understands that EPA proposes to soon issue guidance to the states on how to issue NPDES permits for inflows to 303(d)-listed receiving waters. If EPA and the Regional Board determine that 303(d) revisions are required prior to issuance of a NPDES permit for a full-scale project at San Vicente, justification exists for supporting such a 303(d) delisting or modification. This justification, in part, is based on the following:

- The original 2008 303(d) listing did not examine historic N:P data and ratios as required by the Basin Plan, but instead used a default 10:1 N:P ratio that the Basin Plan states is to be used "in the absence of available data."
- The original 2008 303(d) total nitrogen listing of San Vicente Reservoir was based on historic concentrations and nutrient loads associated with the former 90,000 AF reservoir capacity.

- Demonstration Project reservoir modeling results show that reservoir nutrient concentrations will be lower with expansion of the reservoir.
- San Vicente Reservoir is dominated by imported water inflows, and 303(d) listing of potable water storage reservoirs essentially comprised of imported water is not appropriate.
- Conformance with the Basin Plan biostimulation objectives can be provided through operating the reservoir in a phosphorus-limited mode.

While significant justification exists for delisting or revising the 303(d) listing for San Vicente Reservoir, a number of tasks would be required to proceed through the 303(d) listing process, including:

- coordination between City staff and regulators to determine the required 303(d) revisions,
- bringing technical consultants on-board (if required) to support the 303(d) revision process,
- conducting a technical evaluation of the 303(d) criteria and proposed revisions,
- developing technical documents justifying the proposed 303(d) revisions,
- reviewing proposed 303(d) revisions through the Regional Board stakeholder input and triennial review process,
- preparing the Regional Board staff report for the proposed 303(d) revisions,
- presenting the proposed 303(d) revisions to the Regional Board,
- forwarding the proposed 303(d) list to the State Board,
- State Board staff review of the proposed 303(d) revisions and coordination between State Board and Regional Board staffs,
- conducting the State Board public review and hearing process,
- State Board approval of the proposed 303(d) revisions,
- submitting the proposed 303(d) revisions to EPA, and
- EPA review and approval of the proposed 303(d) revisions.

If 303(d) list revisions are required, State Board and EPA review and approval of the 303(d) list revisions would comprise a significant portion of the overall implementation schedule. The process for achieving revision of the San Vicente Reservoir 303(d) listing could add an additional two to five years to the project implementation schedule, depending on:

- the State Board and Regional Board schedule for the next update to the 303(d) list,
- whether delisting of San Vicente Reservoir or modification of the listing category will be required,
- whether Basin Plan modifications are required in conjunction with the 303(d) list revisions,
- Regional Board staff availability, priorities, and funding, and
- EPA and State Board review and approval.

Implementation Pathway if Basin Plan Revisions are Required. In coordination meetings between the City and Regional Board, Regional Board staff have indicated a preliminary position (subject to confirmation by EPA) that the Basin Plan allows the Regional Board the flexibility to assess N:P ratios on a site-by-site basis and establish project-specific N:P ratios for any given receiving water. The City contends that this flexibility should allow the Regional Board to establish achievable NPDES permit limits for total nitrogen without the need for revision of the Basin Plan, in part, based on the following:

- Historic reservoir N:P data will no longer be applicable to the expanded San Vicente Reservoir, and N:P ratios in the expanded reservoir are largely dependent on which water sources (e.g. Colorado River water, State Water Project water, or purified water) the City stores in the reservoir.
- Reservoir modeling indicates that nutrient concentrations will be reduced in the expanded reservoir compared to historic conditions, regardless of whether or not reservoir augmentation is implemented.
- Implementation of a full-scale project at San Vicente Reservoir would allow the City to better manage biostimulation by maintaining phosphorus-limited conditions in the reservoir.
- Reservoir modeling can be used to help predict and manage potential biostimulation conditions.

If Basin Plan modifications are required prior to issuance of a NPDES permit, tasks required to proceed through the Basin Plan modification process would include:

- coordination between City staff and regulators to determine the required Basin Plan revisions,
- bringing technical consultants on-board to support the Basin Plan revision process,
- assembling data and technical documents to support the proposed Basin Plan revisions,
- assessing conformance of the proposed Basin Plan revisions with applicable state and federal water quality policies,
- preparing the Regional Board staff report and administrative record that supports and justifies the proposed Basin Plan revisions,
- preparing the Tentative Resolution for Basin Plan modification,
- conducting the Regional Board review, public input, and hearing process,
- Regional Board consideration and adoption of the proposed Basin Plan modifications,
- State Board staff review of the proposed Basin Plan modifications,
- State Board consideration and approval of the proposed Basin Plan modifications,
- Review and approval of the proposed Basin Plan modifications by the State of California Office of Administrative law, and
- EPA review and approval of the proposed Basin Plan modifications.

Once the Regional Board has approved the proposed Basin Plan modifications, an additional 12 to 24 months may be required for State Board, Office of Administrative Law, and EPA approval. As a result, the process for revising the Basin Plan could add two to three years to the overall project implementation schedule, depending on:

- the nature of the proposed revisions (e.g. revision of numerical standards vs. revision of implementation provisions),
- Regional Board staff availability, priorities, and funding, and
- State Board, Office of Administrative Law, and EPA review and approval.

Requested Regional Board Feedback. The full-scale project remains technically feasible whether or not EPA or the Regional Board determine that revision of the Basin Plan or 303(d) list is required prior to Regional Board issuance of a NPDES permit for the full-scale project at San Vicente. Requiring such Basin Plan modifications or 303(d) list revisions in advance of the NPDES permit issuance, however, would lengthen the City's implementation schedule and potentially affect the City's decision on whether and how to proceed with a full-scale reservoir augmentation project at San Vicente Reservoir.

The City requests that Regional Board staff coordinate with State Board and EPA staff to determine whether the Regional Board can move forward with implementing attainable NPDES requirements for the City's proposed project without the need for (1) revision of the San Vicente Reservoir 303(d) listings, or (2) modification of the Basin Plan. The City also requests any guidance or recommendations the Regional Board can offer relative to implementing a full-scale project at San Vicente Reservoir.

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Appendix E: San Diego Regional Water Quality Control Board Letter of Concurrence

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California Regional Water Quality Control Board, San Diego Region

February 7, 2013

In reply refer to:
244506jllim

Ms. Marsi A. Steirer
Deputy Director. Public Utilities Department
City of San Diego
600 B Street, Suite 600, MS 906
San Diego, CA. 92101

Subject: Indirect Potable Reuse/Augmentation Project at San Vicente Reservoir

Ms. Steirer:

The City of San Diego (City) submitted, for review and comments, a technical report dated August 2012 entitled, *Proposed Regional Water Quality Control Board Compliance Approach, Final Draft* (Report). The City is proposing an Indirect Potable Reuse/Reservoir Augmentation Project that would supplement the approximate 240,000-acre-foot San Vicente Reservoir with up to 15,000 acre-feet per year (AFY) of purified recycled water produced at a full-scale advanced water treatment facility to be sited at the City's North City Water Reclamation Plant (NCWRP) (hereinafter Project). The Report examines key water quality regulations, permitting issues, and other factors that could affect the timeline for issuance of a National Pollutant Discharge Elimination System (NPDES) permit for discharging purified recycled water into San Vicente Reservoir. The City requested that San Diego Water Board coordinate with the U.S. Environmental Protection Agency, Region 9 (USEPA) in reviewing the Report to determine whether the Board can move forward with implementing attainable NPDES permit requirements for the City's Project without the need for (1) revision of the Clean Water Act (CWA) section 303(d) impairment listings for the San Vicente Reservoir, or (2) modification of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan).

The San Diego Water Board, with concurrence from USEPA, strongly supports the efforts of the City to develop the San Vicente Reservoir Augmentation Project and concurs with the City's preferred NPDES permit pathway described in the Report. The San Diego Water Board has prepared the following comments, in consultation with USEPA, regarding the City's preferred NPDES permit pathway for the Project:

1. Modification of the San Diego Water Board's Basin Plan should not be necessary to prescribe an effluent limitation for nitrogen based on a ratio of nitrogen to phosphorus (N:P ratio) that accounts for the specific water quality factors relevant to the expanded San Vicente Reservoir. The Report indicates the City is projecting the advanced water treatment process discharge will comply with the Biostimulatory Substances total phosphorus water quality objective by a significant margin. With respect to nitrogen, the

Biostimulatory Substances water quality objective allows the San Diego Water Board the flexibility to assess N:P ratios on a site-by-site basis and establish project-specific N:P ratios for any given receiving water in lieu of a 10:1 N: P ratio. The San Diego Water Board does not anticipate that a Basin Plan amendment will be necessary to accomplish this. The San Diego Water Board understands the San Vicente Reservoir is currently undergoing an expansion that will raise the height of San Vicente Dam by 117 feet and increase the reservoir storage capacity from 90,000 acre-feet (AF) to over 240,000 AF. The expanded Reservoir will be subject to a different set of natural conditions that can influence water quality in the Reservoir. Moreover, the historic ratios of nitrogen to phosphorus (N:P ratios) in the Reservoir have largely been a function of how the Reservoir is operated and which source of imported water (e.g. State Project Water or Colorado River) is being delivered to the Reservoir. All of these factors will be considered in developing the supporting rationale and assumptions to derive a site-specific N:P ratio and NPDES Permit numerical nitrogen effluent limitation for the Project discharge to the Reservoir.

2. Modification of the CWA section 303(d) list to remove San Vicente Reservoir will not be required to issue a NPDES permit for the Project. San Vicente Reservoir is identified on the 303(d) list as a water quality limited segment where water quality standards for chloride, color, sulfates, total nitrogen as N and pH are not met and a Total Maximum Daily Load (TMDL) is required, but not yet completed. The TMDL for San Vicente Reservoir is currently scheduled for completion in 2019. Applicable NPDES federal regulations set forth at 40 CFR 122.4(i) do require that once a TMDL is in place, a discharger proposing a new facility discharge of a pollutant of concern must a) demonstrate that there are sufficient remaining pollutant load allocations to allow for the discharge and b) meet the conditions of the TMDL. Modifications to the 303(d) listing for San Vicente Reservoir, if warranted and necessary, may be completed after the issuance of the NPDES permit.

3. The Report indicates the quality of purified recycled water is expected by the City to comply with all California Toxic Rule (CTR) water quality standards for toxic organic and inorganic constituents without the need for an assigned mixing zone or dilution credit. In the event additional data indicate a potential need for the consideration of a CTR mixing zone, it will be necessary for the City to conduct and complete studies to assess mixing zone hydraulics, dilution, and concentrations of CTR constituents at the edge of the mixing zone in advance of the NPDES permit issuance. The San Diego Water Board may grant mixing zones to the City in accordance with the provisions established in the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California.* The allowance for a mixing zone is discretionary and would only apply to a discharge regulated under an NPDES permit.

The heading portion of this letter includes a San Diego Water Board code number noted after "In reply refer to:" In order to assist us in the processing of your correspondence please include this code number in the heading or subject line portion of all correspondence and reports submitted to the San Diego Water Board pertaining to this matter.

If you have any questions regarding this matter please contact David Barker by e-mail at DBarker@waterboards.ca.gov or by phone at (858) 467-2989.

Respectfully,

David Gibson
Executive Officer

DTG:JS:DTB

Tech Staff Info & Use	
Order No.	none
Party (GT/CIWQS) ID	39639
File No.	none
WDID	none
NPDES No.	none
Reg. Measure ID	none
Place ID	244506
Person ID	None
Inspection ID	n/a

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Appendix F: Independent Advisory Panel Findings

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NWRI National Water Research Institute

Joint Powers Agreement Members

Inland Empire Utilities Agency

Irvine Ranch Water District

Los Angeles Department of Water and Power

Orange County Sanitation District

Orange County Water District

West Basin Municipal Water District

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November 16, 2012

Ms. Marsi A. Steirer
Deputy Director
Public Utilities Department
City of San Diego
600 B Street, Suite 600
San Diego, CA 92101

Dear Ms. Steirer:

The National Water Research Institute (NWRI) is pleased to transmit this letter on the findings of the Independent Advisory Panel (Panel) to assist the City of San Diego, California, with its Indirect Potable Reuse/Reservoir Augmentation (IPR/RA) Project.

A previous NWRI Panel, formed in 2004, was asked to review various water reuse options in a report prepared by the City. The Panel submitted a final letter report to the City on December 1, 2005. The Panel found that appropriate alternative water reuse strategies for the City of San Diego had been identified. Subsequently, the City elected to proceed with a pilot demonstration project on indirect potable reuse, known as the Water Purification Demonstration Project (herein, referred to as the "Demonstration Project").

Purpose of 2009-2012 Panel

In 2009, the City requested that NWRI form a Panel to provide expert peer review of the technical, scientific, regulatory, and policy aspects of the proposed Demonstration Project under development by the City, based on the findings from the 2004 Panel's final letter report. The purpose of the Demonstration Project was to evaluate the feasibility of using advanced treatment technology to produce purified water from the tertiary effluent of the North City Water Reclamation Plant that can be sent to the expanded San Vicente Reservoir, blended with other raw water, treated in the existing Alvarado drinking water treatment plant, and distributed as potable water.

As part of the Panel process, the Panel was charged with:

- Assisting the City and California Department of Public Health (CDPH) to establish a pathway to move from the draft groundwater regulations to surface water augmentation criteria. This effort includes recommending criteria (or suggested regulations) and verifying the various optional advanced water treatment (AWT) and reservoir strategies that will ensure safe drinking water at consumer taps.
- Assisting the City in developing the Demonstration Project work plan. This effort includes a review of the reservoir modeling studies and performance of the AWT demonstration plant.

The Panel included 10 members who represented local and national expertise in environmental engineering, water reuse regulations, toxicology, environmental chemistry, limnology, microbiology, and other fields relevant to the project. Six of the Panel members were part of the 2004-2005 Panel.

Panel Activities

The full Panel met three times during the period of 2009-2012 and held three subcommittee meetings on limnology and reservoir operation and two subcommittee meetings on the Advanced Water Purification Facility. Panel members also participated in two working group meetings held by the City on limnology and reservoir operation. Each Panel meeting or subcommittee meeting resulted in a report that was prepared by members of the Panel and submitted to the City. A total of seven reports were prepared by the Panel.

Findings

The City's staff and consultants are to be commended for the positive and thoughtful approach they used to address the many challenges associated with the planning and implementation of the Demonstration Project. The Panel believes that the *Water Purification Demonstration Project Final Report (October 2012)* and supporting documents are responsive to the directives set forth by the City Council. The Panel is also pleased with the responsiveness of the City's staff and consultants to the comments and recommendations made by the Panel. The Panel recognizes that:

1. The City considered various options for municipal wastewater reuse strategies and selected a proven treatment process scheme for indirect potable reuse that will meet or exceed all health and safety requirements, based on the successful implementation of the Groundwater Replenishment System at the Orange County Water District. The Advanced Water Purification Facility was operated by the City for a period of 13½ months in various modes to assess alternative membrane filtration equipment and reverse osmosis operational configurations. The findings from the Demonstration Project showed that the purified water met or exceeded all of the drinking water requirements and also provided multiple barriers for regulated and unregulated chemical and microbial constituents. The water produced is of a higher quality than any source available to the City of San Diego.

2. With the help of consultants, City staff has undertaken an extensive program of modeling the behavior of both the existing and expanded San Vicente Reservoir, with respect to water quality and hydrodynamics. The model was verified and is an effective tool in simulating future impacts of the addition of purified water to the reservoir. The reservoir provides a minimum of hundred-fold (2 logs) dilution of the purified water added to the reservoir. In fact, for the majority of water quality constituents, the quality of the purified water is better than the water in the reservoir.

3. City staff has met and engaged with the local and state public health and water quality control agencies to ensure that the water produced would meet and exceed all health and safety requirements for all designated uses, including indirect potable reuse. Based on a review of the material provided by the City, CDPH has issued a letter approving the indirect potable reuse project concept. In addition, the Regional Water Quality Control Board San Diego Region (working in conjunction with the State Water Resources Control Board and U.S. Environmental Protection Agency) is also working with the City to develop a plan that will allow for the addition of purified water to the reservoir.

4. City staff has conducted an extensive public outreach program involving a speaker's bureau, community events, facility tours, surveys, and social media. Because of the outreach effort, community support has increased significantly. The City staff has been forthcoming, open, and transparent in describing all aspects of the indirect potable reuse project to the public, including encouraging the public to tour the Advanced Water Purification Facility.

Conclusion

It is the unanimous conclusion of the Panel that the project as described in the *Water Purification Demonstration Project Final Report* will be a landmark development in the acceptance and furtherance of indirect potable reuse and will contribute to the City of San Diego's water portfolio. The proposed project will supplement existing sources and provide a greater degree of independence, thus improving the reliability of the existing water supply. The successful implementation of the full-scale water purification project will facilitate additional potable reuse in San Diego and other communities in California and the United States.

Respectfully submitted by the NWRI Independent Advisory Panel,

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Appendix G: Summary of Cost Assumptions (Section 8.4 of the City of San Diego 2012 Recycled Water Study)

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8.4 Financial Evaluation of Alternatives

A financial evaluation was performed, which included each Integrated Reuse Alternative considered in this Study. The financial evaluation was prepared to ultimately help decision-makers compare the costs of different water reuse approaches and to aid in making decisions about whether to invest in the water reuse system. The guiding principles for the evaluation included:

- Provide transparent costing of alternatives.
- Provide multiple opportunities at workshops and Stakeholder meetings to review, discuss, and debate project costs.
- Prepare a comparative financial evaluation of the Integrated Reuse Alternatives and include financing costs.
- Compare the water reuse alternative costs to other options facing the City and Participating Agencies.

The financial evaluation included a Net Present Value financial spreadsheet model (financial model). The financial model was used to calculate and compare unit costs (in terms of dollars per acre foot) for each Integrated Reuse Alternative against the current cost of imported untreated water. The financial model included fixed and variable inputs, which were used to perform a sensitivity analysis.

8.4.1 Financial Model Cost Components

The costing process consisted of a multi-step approach. The following summarizes the major steps:

- **Development of Unit Costs for Infrastructure.** Unit costs for treatment and conveyance facilities were prepared to estimate infrastructure costs. The unit costs were based on 23 Bid Summaries, two formal agency estimating tools, 14 project cost estimates, and insight and experience from the three national consulting team members performing this Study. The unit costs were first reviewed in the Coarse Screening Session and updated through the course of the project. One revision included modifying the unit costs to provide economy of scale adjustments (i.e. larger facilities are less expensive to build and operate than smaller facilities with similar processes and construction methods). This adjustment was based on City cost data and the EPA's *Guide to the Selection of Cost-Effective Wastewater Treatment Systems* (EPA-430/9-75-002; July 1975).
- **Integrated Reuse Alternative Costs.** Costs for each alternative were developed and reviewed in the Coarse Screening Session and the Fine Screening Session. The costs included:
  - **Capital Costs.** Capital costs were developed using the Study's unit costs described above. Capital costs were multiplied by cost factors related to the difficulty of construction at each site. Factors varied from 1.0 to 1.5 times the unit costs. Tunneling allowances were also included as an allowance for utility conflicts and for avoiding high traffic areas, streams, freeways, rail, or sensitive environmental areas.
  - **Operation and Maintenance Costs.** Operation and maintenance costs were also developed based on the Study's unit costs (for treatment facilities) and values developed in the 2005 Water Reuse Study (for conveyance facilities including pipelines, pump stations and reservoirs). Treatment facility costs included labor, chemicals, energy, and materials. Costs for conveyance facilities were calculated as a percentage of the capital costs. An electricity cost of $0.12 per kilowatt-hour was used for treatment and pump station operations.
  - **Soft Costs.** A 50-percent soft cost allowance was provided for Engineering, Administration, Legal, Construction Management and Environmental Permitting costs

- **Land Acquisition.** Although a majority of the facilities planned are located on City parcels, additional land or alignments may need to be acquired. A cost equal to 4 percent of the estimated construction cost was included for these purposes.

- **Financial Model Assumptions.** Financial model assumptions were coordinated for consistency with other City financial model assumptions. These assumptions were fixed for all scenarios. It is the practice of the City to finance 20-percent of all capital projects with rates and fees. Funds derived from rates are the main source of funds for day-to-day operational and maintenance costs and debt coverage requirements. The assumptions related to financing include the following:
  - Interest rate of 5.5 percent on revenue bonds and 2.5 percent on State Revolving Fund (SRF) loans
  - Repayment period of 30 years on revenue bonds and 20 years on SRF loans
  - Issuance costs of 2.5 percent on revenue bonds and 1.0 percent on SRF loans
  - Debt coverage of 1.25 percent on revenue bonds and 1.2 percent on SRF loans
  - Maximum loan under SRF of $50 million per year
  - Complying with revenue bonds requires a reserve amount equal to one payment to be set aside at issuance
  - O&M escalation for chemical, energy, and labor set at 4.0 percent; Capital cost escalation set at 3.0 percent
  - Net Present Value analysis for 50 years
  - ENR Los Angeles cost basis index of 10051.30

8.4.2 Comparative Costs Basis Using a Sensitivity Analysis

The costs for the reuse program proposed in this Study will be compared to the cost of imported untreated water, and other alternative water supply projects (such as desalination). It is important to note that the cost presented for the reuse alternatives in this Study are fully loaded (including capital, O&M and financing costs). It is common for other new alternative water supply costs to be partial costs, including overly optimistic assumptions or certain exclusions. The costs for the alternatives presented in this Report were prepared to provide thorough and realistic budgetary estimates

8.4.3 Gross Costs

Gross Costs were calculated to determine the investment required for each Integrated Reuse Alternative. To achieve a realistic picture of Gross Costs, the financial evaluation included a sensitivity analysis with bracketed (bookend) conditions, using variables described as follows and summarized in Table 8-12:

- **Favorable Condition.** The favorable condition assumed the best-case scenario using the most favorable cost variables. This included 30-percent grant funding, $450 per acre-foot local resource program credits for 20 years, and a 20-percent project contingency.
- **Unfavorable Condition.** The unfavorable condition assumed the worst-case scenario related to the variable costs. This condition included 10-percent grant funding, $100 per acre-foot local resource program credits for 20 years, and a 40-percent project contingency.

Table 8-12. Gross Costs Variables				
Item	**Description**	**Favorable Scenario**	**Unfavorable Scenario**	**Average**
Grants	To help offset the costs associated with projects, the City can apply for grants to help finance a portion of the capital projects. Grants usually consist of funds that are obtained from state or federal agencies and do not need to be paid back. This is the preferred option among municipal utilities. The grants usually have stipulations regarding the type of projects that can be included and how the money is managed; therefore, additional administrative costs also come with the funds. Typically, grant amounts vary depending on the project type. Projects promoting water reuse have generally been well supported, with multiple programs such as the Bureau of Reclamation's Title XVI Program and California's bond measures. The analysis assumes receiving grant funding offsetting 10 to 30-percent of each Integrated Reuse Alternative's capital costs.	30%	10%	20%
Local Resource Program	To help offset the costs associated with new water projects, the City has participated in the Local Resource Program offered by MWD and the Local Water Supply Development funding provided by the SDCWA (these two programs are collectively referred to herein as the LRP). The LRP was created to promote the development of water recycling and groundwater recovery projects in order to replace an existing demand or prevent a new demand on imported water supplies. Since the City relies indirectly on imported water from MWD/SDCWA, it may be eligible to receive a credit up to $450 per acre-foot produced. The program is dependent on available funding and agency approvals and usually comes with a fixed term. For this Study, a 20-year term and a funding level of $100 to $450 per acre-foot were assumed. One caveat is that the LRP credit is discontinued once the cost to produce the alternative water supply source becomes cheaper than the cost of imported water.	$450/acre-foot, 20 years	$100/acre-foot, 20 years	$275/acre-foot, 20 years
Project Contingency	A project contingency was added to the construction costs of all alternatives. Contingencies are important at this level of planning to account for unknown conditions or additional facilities needed once more detailed evaluations or design is complete. The analysis assumes project contingencies adding 20-percent to 40-percent to the Integrated Reuse Alternative's capital costs.	20%	40%	30%

8.4.4 Net Costs

Net Costs are considered "real" or "true" costs for the purposes of comparing reuse projects to imported untreated water and other alternative water sources. Net Costs account for savings, offsets and credits that occur as a result of the reuse projects. For example, constructing a new reuse plant upstream of the Point Loma Plant reduces flows to the Point Loma Plant, resulting in lower capital and operational costs at the Point Loma Plant. These reduced costs are subtracted from the Gross Costs to get the Net Costs or "true" program cost. This is similar to the Orange County Groundwater Replenishment System, which was responsible for substantial savings by avoiding costly outfall improvements.

The variables associated with the Net Cost calculations are described in Table 8-13. Additional information regarding Net Costs is included in a Cost Methodology Summary included in Appendix H. The Cost Methodology Summary is presented in an informative, frequently asked question (FAQ) format. This document summarizes direct and indirect wastewater savings calculations and includes a graphical comparison of the key wastewater facilities included in this Study with the City's September 2011 Draft Wastewater Master Plan facilities.

Table 8-13. Net Cost Variables		
Component	**Description**	**Savings**
Tier 1 - Direct Wastewater System Savings • Reduction of flows to downstream facilities • Remaining Point Loma capacity is upgraded to Secondary	The Study's Alternatives achieve the goal of offloading flows away from the Point Loma Plant, resulting in reduced capital and operating costs at downstream wastewater facilities. The direct wastewater system savings were calculated by comparing the size of the Point Loma Plant proposed in the City's September 2011 Draft Wastewater Master Plan (adjusted to a secondary treatment option) to the smaller Point Loma Plant size (which includes secondary treatment) in this Study (assuming the reuse projects in this Recycled Water Study are implemented). The cost difference is the savings directly attributable to these reuse projects. See Appendix H for additional details.	$557 million (capital savings) $27.6 million/year (operation and maintenance savings)
Tier 2 - Salt Reduction Credit • Water quality improvements to water & wastewater systems due to indirect potable reuse • Homeowner and business benefits not included in total	Similar to the 2005 Water Reuse Study, a salt credit was considered to account for the benefits of salinity reduction in the watershed. The salt credit basis is from the 1999 Salinity Management Study (MWD, USBR). The quantitative credit shown is the financial benefits of extending the life of the municipal water and wastewater treatment systems from having lower salinity levels in the water and wastewater flows. The San Vicente and Otay Lakes Reservoirs could see dramatic reductions in salinity levels from the proposed indirect potable reuse projects. Downstream agency facilities including drinking water treatment plants and the Harbor Drive advanced water purification facilities would benefit from this reduced salinity. In addition to the benefit shown, there is a benefit to water customers, since water heaters, clothes washers, dishwashers, and fixtures will also last longer with lower salinity levels. The combined savings included in the City's 2005 Water Reuse Study was $250/AF. The $100/AF value used in this Study only accounts for the estimated municipal treatment equipment savings.	$100/acre foot (not including customer savings)
Tier 3 - Indirect Wastewater System Savings • Remaining Point Loma capacity maintained at CEPT • Quantifies savings if this approach is attributable to the reuse program	The Point Loma Plant will either continue to use chemically enhanced primary treatment or will require upgrades to secondary treatment. This Study does not provide an opinion on whether CEPT or secondary treatment processes should be employed at the Point Loma Plant. However, it is prudent to summarize the reduced Point Loma capital and operational costs if CEPT status could be maintained for the remaining Point Loma Plant capacity after reuse projects and with the South Bay Diversion. The indirect wastewater savings are therefore calculated as the avoided secondary treatment costs at the Point Loma Plant. See Appendix H for additional details.	$463 million (capital savings) $13.0 million/year (operation and maintenance savings).
Qualitative Water System Savings	The local, regional and statewide water systems were considered for potential savings from increasing water reuse. Since quantitative costs could not be developed with current available information, qualitative benefits were considered, particularly at the regional and statewide level. The region's local water treatment plants treat water from local runoff (which is limited) and imported untreated water from the SDCWA and MWD (which is subject to cutbacks and higher price fluctuations). Indirect potable reuse projects provide a reliable, uninterruptable untreated water equivalent that would help supply the local water treatment plants that ratepayers have invested in over the past decade. Indirect potable reuse projects may defer or eliminate the need to expand the imported untreated water conveyance system needed to serve these treatment plants. The SDCWA Master Plan (currently underway) may help quantify what these benefits are in future updates to this Study. In addition, Stakeholders emphasized an additional benefit related to the need to fix water supply conditions in the California Bay-Delta (which has the potential for substantial cost impacts for Southern California). Water reuse projects reduce the burden on importing water from the Bay-Delta, providing an additional benefit for these projects.	Quantitative benefits are speculative, therefore this category is currently considered qualitatively

8.4.5 Cost Summary for Integrated Reuse Alternatives

The Integrated Reuse Alternative costs are summarized in Table 8-14. The table includes a tiered breakout of summary level costs based on the Gross Costs and Net Costs categories described above. As shown, the costs for A1, A2 and B3 are nearly identical to each other, and slightly higher than B1 and B2. For the A1/A2 comparison to B1/B2, the increased costs occur mainly due to the additional wastewater facilities and pumping needed to divert flows from Morena to the North City Plant. For the B3 comparison to B1/B2, B3 adds an additional plant and does not have the same economy of scale that the B1 and B2 Alternatives have. Implementation steps are included later in this Chapter, which include steps to further develop the Alternatives and look for additional cost savings.

Table 8-14. Cost Summary (2011 $/AF)

Alternative	Average Gross Costs	Net Costs		
		Tier 1 - Direct Wastewater System Savings	**Tier 2 - Salt Reduction Credit**	**Tier 3 - Indirect Wastewater System Savings**
		Remaining Point Loma capacity upgraded to Secondary	*Water Quality Benefit to Water/Wastewater System*	*Remaining Point Loma capacity maintained at CEPT*
A1: North City 45 mgd; Split Harbor Dr. AWPF	$1,900	$1,300	$1,200	$800
A2: North City 45 mgd; Consolidated Harbor Dr. AWPF	$1,900	$1,300	$1,200	$800
B1: North City 30 mgd; Split Harbor Dr. AWPF	$1,700	$1,100	$1,000	$600
B2: North City 30 mgd; Consolidated Harbor Dr. AWPF	$1,700	$1,100	$1,000	$600
B3: North City 30 mgd; Consolidated Harbor Dr. AWPF; Mission Gorge AWPF	$1,900	$1,300	$1,200	$800

Notes:

- *All Alternatives include South Bay Option C2 expansion with the Spring Valley No. 8 Diversion*
- *Direct and indirect wastewater system savings based on a comparison between the City's September 2011 Draft Wastewater Master Plan and the reduced wastewater facility sizing and pumping required as a resulted of the projects included in this Recycled Water Study (see Appendix H).*
- *Totals are in 2011 dollars (ENR Los Angeles Index value of 10,051.30, June 2011) and are based on a net present value analysis using a detailed financial model.*
- *Financial model sensitivity analysis generally produced cost ranging +/- $200/AF of the values shown. Favorable conditions could result in lower costs than shown.*

Key Study Conclusion

The Alternative Net Costs represent the costs that should be compared to other water sources – particularly imported untreated water. The average costs of the Alternatives above are:

- Cost assuming direct wastewater savings = $1,200/AF
- Cost assuming above plus salt credit = $1,100/AF
- Cost assuming above plus indirect wastewater savings = $700/AF

These costs compare well to the 2011 untreated water cost of $904 per acre foot, and are more economical than most other new water supply concepts being proposed.

The net cost tiers are summarized as follows:

- **Tier 1: Net Costs with Direct Wastewater System Savings.** This tier includes the Direct Wastewater System Savings that occur as a result of the water reuse projects in this Study which help to avoid approximately 100 mgd of secondary treatment improvements at the Point Loma Plant. This tier represents the first threshold in which the Alternative costs should be considered for comparison to the cost of other water sources – such as imported untreated water or other new water sources. The comparison, as outlined in the next section, is very favorable compared to untreated water and more economical than most water supply concepts being proposed at this time.
- **Tier 2: Net Costs with the Salt Credit (Including Tier 1 Savings).** This tier includes the Salt Reduction Credit Savings and adds a $100/acre-foot credit occurring as a result of the water quality benefits created by implementing indirect potable reuse projects. The savings included is attributable to benefits received by agency facilities downstream of the new projects, including wastewater facilities. Additional savings (not accounted for in this total) would be experienced by homeowners and business as described in Chapter 6. Although these benefits are real, the ability to recover these savings and allocate them to the reuse program led to extracting this element as a separate unit cost tier so it may be considered separately from other savings.
- **Tier 3: Net Costs with Indirect Wastewater System Savings (including Tier 1 and Tier 2 Savings).** As described in the table above, this Study does not provide an opinion on whether the Point Loma Plant should continue to use CEPT treatment processes or upgrade to secondary processes. However, it was considered appropriate to list the Net Costs of the new water if the water reuse program proposed in this Study led to maintaining CEPT treatment for the remaining flows that reach the Point Loma Plant (i.e., the remaining flows that are not recycled upstream).

The Study Alternative's Net Costs were extrapolated based on a 3.5-percent inflation rate and compared to projected untreated imported water rate as shown in Figure 8-8. The 2011 SDCWA municipal and industrial untreated imported water rate was $904 per acre foot. The existing rate was inflated through 2020 based on the "low-rate" scenario values provided by the SDCWA in April 2011 (which averages to a 5.8-percent annual increase). Beyond 2020, the untreated water cost projectionswere bracketed based on various infiltration scenarios ranging from 3 to 6 percent (shown as the shaded area). These scenarios compare well to the Net Costs of the Study's Alternatives (shown as solid lines). The Study's Net Costs shown are the average of all the Study Alternatives and an average of the Favorable and Unfavorable scenario (i.e., the lower cost B1/B2 Alternatives and the favorable scenario would lower the reuse costs further). As shown, the average Tier 1 and Tier 2 cost curves have Net Costs lower than most of the untreated imported water rate scenarios. If the Tier 3 savings are attributed to the projects in this Study, the program would have significantly lower Net Costs than all untreated imported water rate scenarios. An additional consideration is the long-term effects that other local water projects and reduced demands are causing to MWD/SDCWA rates. As purchases decline, rates must increase to cover fixed costs. This is likely to cause imported water costs to inflate faster than locally controlled projects. Overall, the conclusion of this analysis supports the water reuse program proposed in this Study.

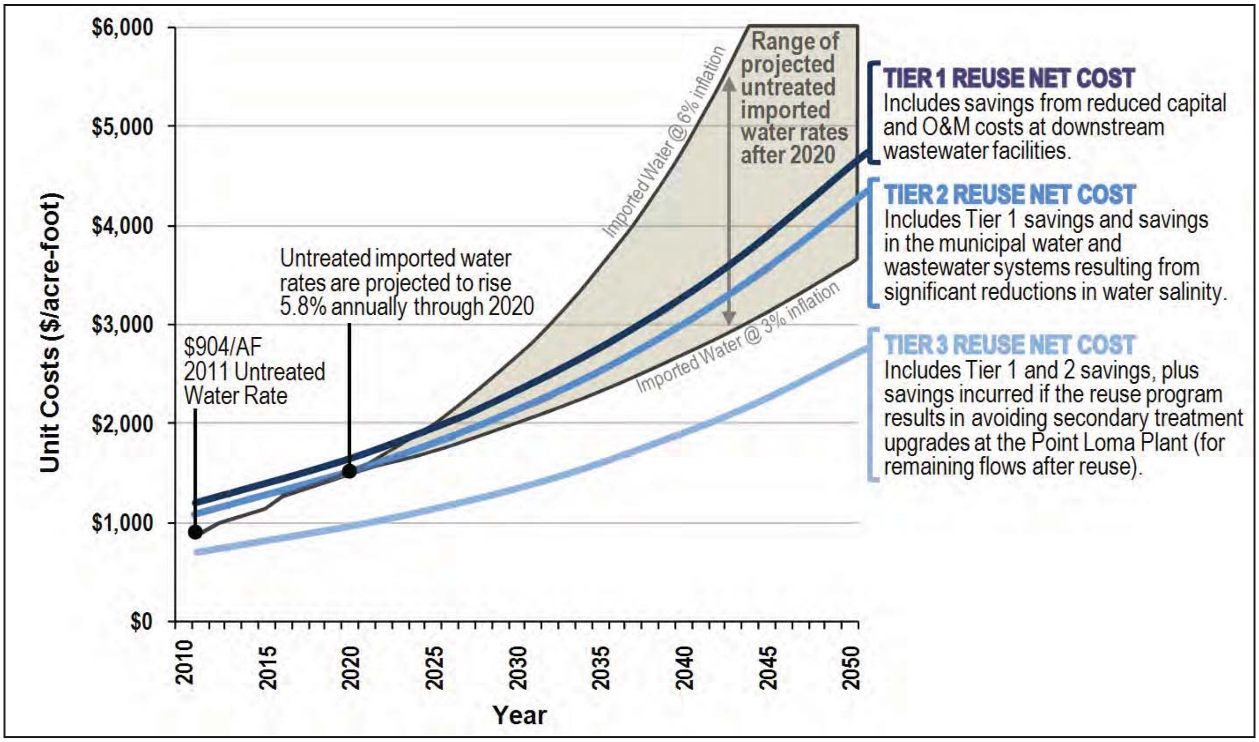

Figure 8-8. Comparison of Reuse Alternative Net Costs to Imported Untreated Water

The Integrated Reuse Alternative Net Costs compare well to projected untreated imported water rates. Untreated water rates are projected to rise 5.8 percent through 2020 and there remain many uncertainties regarding future costs associated with the Bay-Delta fix and imported water.

A detailed cost breakdown for the Favorable and Unfavorable Financial Evaluation scenarios is included in Tables 8-15 and 8-16, respectively. Capital and operation and maintenance cost estimates for each Integrated Reuse Alternative can be found in Appendix F.

Table 8-15. Financial Details for the Favorable Scenario					
Item	**Theme A1**	**Theme A2**	**Theme B1**	**Theme B2**	**Theme B3**
O&M and Capital Debt					-
Interest from Reserve	25,769,150	25,923,958	23,557,882	23,663,931	25,715,525
Operation & Maintenance	1,757,803,600	1,753,642,189	1,612,278,853	1,599,768,756	1,799,893,592
Debt Service	876,467,167	881,123,259	776,617,870	779,795,118	854,165,858
Total PV Cost	$2,608,501,617	$2,608,841,490	$2,365,338,840	$2,355,899,943	$2,628,343,925
Total Cost, Annual Payments	$154,061,888	$154,081,962	$139,700,342	$139,142,867	$155,233,804
Capital (PAYGO Financed)					
PAYGO Financing	321,118,587	322,724,896	283,626,663	284,730,678	311,771,510
Total PV Cost	$321,118,587	$322,724,896	$283,626,663	$284,730,678	$311,771,510
Total Cost, Annual Payments	$18,965,729	$19,060,600	$16,751,402	$16,816,607	$18,413,677
Credits/Avoided Costs					
LRP Credit	200,257,301	200,257,301	191,430,259	191,430,259	196,474,283
Total PV Cost	$200,257,301	$200,257,301	$191,430,259	$191,430,259	$196,474,283
Total Cost, Annual Payments	$11,827,487	$11,827,487	$11,306,149	$11,306,149	$11,604,056
Tier 1: Wastewater O&M Avoided Costs	515,354,315	515,354,315	515,354,315	515,354,315	515,354,315
Wastewater PAYGO/Debt Avoided Costs	436,611,784	436,611,784	436,611,784	436,611,784	436,611,784
Total PV Cost	$951,966,099	$951,966,099	$951,966,099	$951,966,099	$951,966,099
Total Cost, Annual Payments	$56,224,498	$56,224,498	$56,224,498	$56,224,498	$56,224,498
Tier 2: Salt Credit	184,706,087	184,706,087	178,800,483	178,800,483	182,175,128
Total PV Cost	$184,706,087	$184,706,087	$178,800,483	$178,800,483	$182,175,128
Total Cost, Annual Payments	$10,909,009	$10,909,009	$10,560,216	$10,560,216	$10,759,527
Tier 3: CEPT O&M Avoided Costs	242,457,015	242,457,015	242,457,015	242,457,015	242,457,015
CEPT PAYGO/Debt Avoided Costs	362,889,796	362,889,796	362,889,796	362,889,796	362,889,796
Total PV Cost	$605,346,812	$605,346,812	$605,346,812	$605,346,812	$605,346,812
Total Cost, Annual Payments	$35,752,661	$35,752,661	$35,752,661	$35,752,661	$35,752,661
Water Produced (AF)	96,162	96,162	96,162	96,162	96,162
Gross Costs (Includes O&M, Capital, Grants and LRP)					
Total Costs NPV	$2,729,362,903	$2,731,309,085	$2,457,535,244	$2,449,200,361	$2,743,641,152
Total Cost, Annual Payments	$161,200,131	$161,315,075	$145,145,595	$144,653,325	$162,043,425
Total Cost: $/AF (2011)	$1,700	$1,700	$1,500	$1,500	$1,700
Total Cost: $/Gallon (2011)	$0.0052	$0.0052	$0.0046	$0.0046	$0.0052
Net Cost Tier 1 (Direct Wastewater System Savings)					
Total Costs NPV	$1,777,396,804	$1,779,342,987	$1,505,569,145	$1,497,234,263	$1,791,675,053
Total Cost, Annual Payments	$104,975,633	$105,090,577	$88,921,097	$88,428,827	$105,818,927
Total Cost: $/AF (2011)	$1,100	$1,100	$900	$900	$1,100
Total Cost: $/Gallon (2011)	$0.0034	$0.0034	$0.0028	$0.0028	$0.0034
Net Cost Tier 2 (Salt Credit Plus Tier 1 Savings)					
Total Costs NPV	$1,592,690,717	$1,594,636,899	$1,326,768,662	$1,318,433,779	$1,609,499,925
Total Cost, Annual Payments	$94,066,623	$94,181,568	$78,360,881	$77,868,611	$95,059,400
Total Cost: $/AF (2011)	$1,000	$1,000	$800	$800	$1,000
Total Cost: $/Gallon (2011)	$0.0031	$0.0031	$0.0025	$0.0025	$0.0031
Net Cost Tier 3 (Indirect Wastewater System Savings Plus Tier 1 and Tier 2 Savings)					
Total Costs NPV	$987,343,905	$989,290,088	$721,421,850	$713,086,968	$1,004,153,114
Total Cost, Annual Payments	$58,313,963	$58,428,907	$42,608,221	$42,115,950	$59,306,739
Total Cost: $/AF (2011)	$600	$600	$400	$400	$600
Total Cost: $/Gallon (2011)	$0.0018	$0.0018	$0.0012	$0.0012	$0.0018

** See section 8.4 for assumptions. The total costs were adjusted as noted to 2011 $'s for comparison to the SDCWA untreated water costs.*

Table 8-16. Financial Details for the Unfavorable Scenario

Item	Theme A1	Theme A2	Theme B1	Theme B2	Theme B3
O&M and Capital Debt					-
Interest from Reserve	40,515,384	40,756,326	36,991,977	37,156,991	40,385,393
Operation & Maintenance	1,757,803,600	1,753,642,189	1,612,278,853	1,599,768,756	1,799,893,592
Debt Service	1,385,732,744	1,392,960,001	1,224,977,635	1,229,911,800	1,347,713,119
Total PV Cost	$3,103,020,960	$3,105,845,864	$2,800,264,511	$2,792,523,565	$3,107,221,318
Total Cost, Annual Payments	$183,268,918	$183,435,761	$165,387,683	$164,930,491	$183,516,997
Capital (PAYGO Financed)					
PAYGO Financing	357,032,668	358,816,714	315,338,882	316,565,050	346,633,018
Total PV Cost	$357,032,668	$358,816,714	$315,338,882	$316,565,050	$346,633,018
Total Cost, Annual Payments	$21,086,867	$21,192,235	$18,624,372	$18,696,791	$20,472,649
Credits/Avoided Costs					
LRP Credit	44,501,622	44,501,622	42,540,058	42,540,058	43,660,952
Total PV Cost	$44,501,622	$44,501,622	$42,540,058	$42,540,058	$43,660,952
Total Cost, Annual Payments	$2,628,330	$2,628,330	$2,512,477	$2,512,477	$2,578,679
Tier 1: Wastewater O&M Avoided Costs	515,354,315	515,354,315	515,354,315	515,354,315	515,354,315
Wastewater PAYGO/Debt Avoided Costs	436,611,784	436,611,784	436,611,784	436,611,784	436,611,784
Total PV Cost	$951,966,099	$951,966,099	$951,966,099	$951,966,099	$951,966,099
Total Cost, Annual Payments	$56,224,498	$56,224,498	$56,224,498	$56,224,498	$56,224,498
Tier 2: Salt Credit	184,706,087	184,706,087	178,800,483	178,800,483	182,175,128
Total PV Cost	$184,706,087	$184,706,087	$178,800,483	$178,800,483	$182,175,128
Total Cost, Annual Payments	$10,909,009	$10,909,009	$10,560,216	$10,560,216	$10,759,527
Tier 3: CEPT O&M Avoided Costs	242,457,015	242,457,015	242,457,015	242,457,015	242,457,015
CEPT PAYGO/Debt Avoided Costs	362,889,796	362,889,796	362,889,796	362,889,796	362,889,796
Total PV Cost	$605,346,812	$605,346,812	$605,346,812	$605,346,812	$605,346,812
Total Cost, Annual Payments	$35,752,661	$35,752,661	$35,752,661	$35,752,661	$35,752,661
Water Produced (AF)	96,162	96,162	96,162	96,162	96,162
Gross Costs (Includes O&M, Capital, Grants and LRP)					
Total Costs NPV	$3,415,552,006	$3,420,160,956	$3,073,063,335	$3,066,548,557	$3,410,193,384
Total Cost, Annual Payments	$201,727,454	$201,999,666	$181,499,577	$181,114,805	$201,410,966
Total Cost: $/AF (2011)	$2,100	$2,100	$1,900	$1,900	$2,100
Total Cost: $/Gallon (2011)	$0.0064	$0.0064	$0.0058	$0.0058	$0.0064
Net Cost Tier 1 (Direct Wastewater System Savings)					
Total Costs NPV	$2,463,585,907	$2,468,194,857	$2,121,097,236	$2,114,582,458	$2,458,227,285
Total Cost, Annual Payments	$145,502,956	$145,775,167	$125,275,079	$124,890,306	$145,186,468
Total Cost: $/AF (2011)	$1,500	$1,500	$1,300	$1,300	$1,500
Total Cost: $/Gallon (2011)	$0.0046	$0.0046	$0.0040	$0.0040	$0.0046
Net Cost Tier 2 (Salt Credit Plus Tier 1 Savings)					
Total Costs NPV	$2,278,879,820	$2,283,488,770	$1,942,296,753	$1,935,781,975	$2,276,052,157
Total Cost, Annual Payments	$134,593,947	$134,866,158	$114,714,863	$114,330,091	$134,426,941
Total Cost: $/AF (2011)	$1,400	$1,400	$1,200	$1,200	$1,400
Total Cost: $/Gallon (2011)	$0.0043	$0.0043	$0.0037	$0.0037	$0.0043
Net Cost Tier 3 (Indirect Wastewater System Savings Plus Tier 1 and Tier 2 Savings)					
Total Costs NPV	$1,673,533,008	$1,678,141,958	$1,336,949,941	$1,330,435,163	$1,670,705,346
Total Cost, Annual Payments	$98,841,286	$99,113,498	$78,962,202	$78,577,430	$98,674,280
Total Cost: $/AF (2011)	$1,000	$1,000	$800	$800	$1,000
Total Cost: $/Gallon (2011)	$0.0031	$0.0031	$0.0025	$0.0025	$0.0031

** See section 8.4 for assumptions. The total costs were adjusted as noted to 2011 $'s for comparison to the SDCWA untreated water costs.*

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Appendix H: Public Outreach and Education
(provided on separate CD)

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Appendix H:
Public Outreach and Education

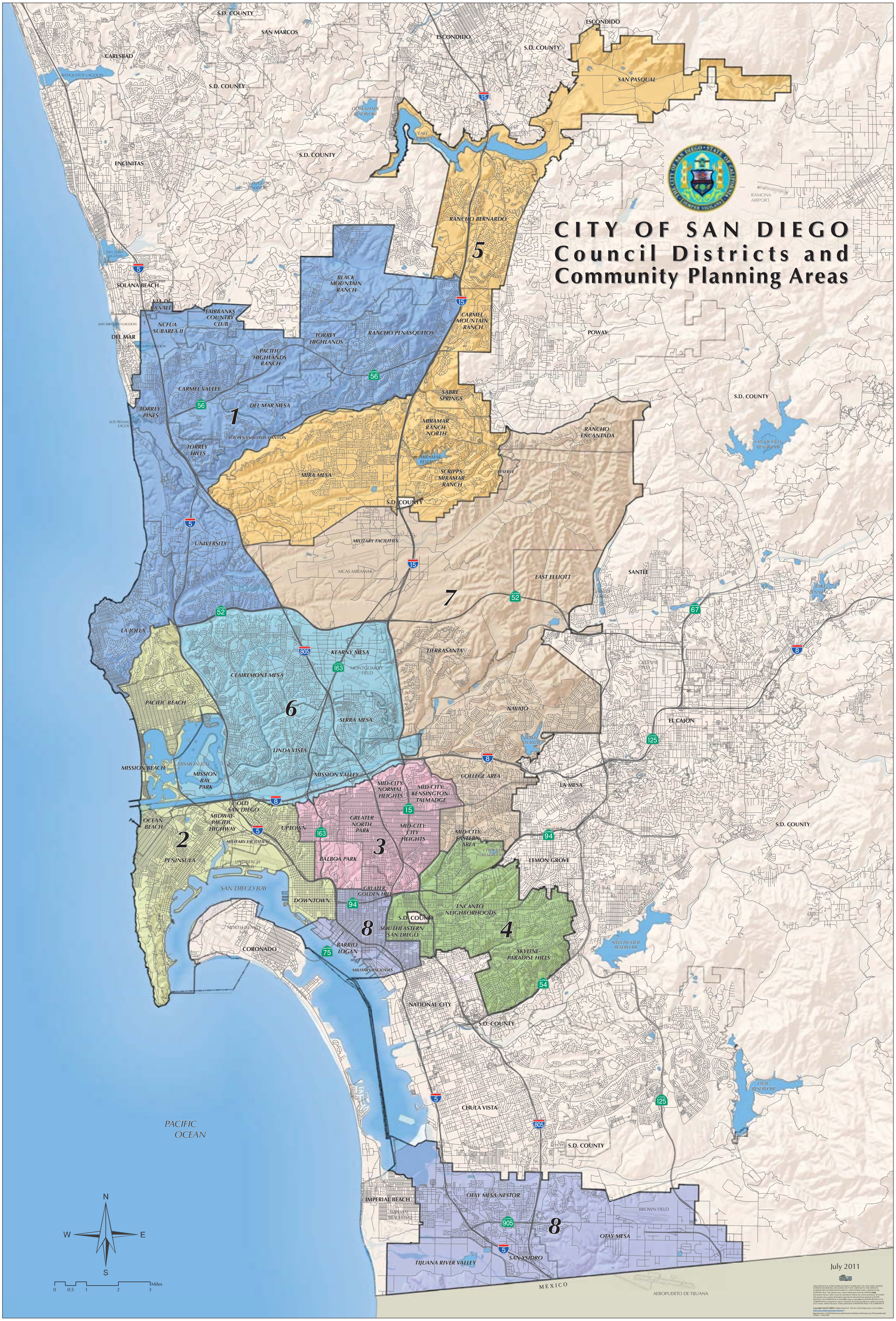
Appendix Introduction

This appendix includes materials from the City of San Diego's Water Purification Demonstration Project's public outreach and education program from spring 2010 through December 31, 2012. These materials correspond to those referenced in Section E: Public Outreach and Education of the Project Report document.

The appendix is divided into seven parts, which correspond with those found in Section E:

A table of contents is found at the beginning of each section of the appendix to describe in further detail the materials found on the following pages. In electronic format, the table of contents includes hyperlinks that link directly to the pages within the document.

For council districts mentioned within the materials, the eight-district San Diego City Council map that reflected district boundaries from the beginning of the Demonstration Project until late 2012 was referenced. This map is displayed on the following page.


CITY OF SAN DIEGO
Council Districts and
Community Planning Areas
July 2011
S.D. COUNTY
SAN MARCOS
ESCONDIDO
CARLSBAD
BATIQUITOS LAGOON
SAN PASQUAL
ENCINITAS
RAMONA AIRPORT
RANCHO BERNARDO
5
SOLANA BEACH
BLACK MOUNTAIN RANCH
CARMEL MOUNTAIN RANCH
VIA DE LA VALLE
FAIRBANKS COUNTRY CLUB
NCFUA SUBAREA II
DEL MAR
TORREY HIGHLANDS
RANCHO PENASQUITOS
POWAY
PACIFIC HIGHLANDS RANCH
CARMEL VALLEY
SABRE SPRINGS
TORREY PINES
DEL MAR MESA
1
MIRAMAR RANCH NORTH
RANCHO ENCANTADA
TORREY HILLS
LOS PENASQUITOS CANYON
MIRA MESA
SCRIPPS MIRAMAR RANCH
UNIVERSITY
MILITARY FACILITIES
MCAS MIRAMAR
EAST ELLIOTT
SANTEE
7
LA JOLLA
KEARNY MESA
TIERRASANTA
CLAIREMONT MESA
MONTGOMERY FIELD
PACIFIC BEACH
6
SERRA MESA
NAVAJO
EL CAJON
LINDA VISTA
MISSION BEACH
MISSION BAY PARK
MISSION VALLEY
COLLEGE AREA
MID-CITY: NORMAL HEIGHTS
MID-CITY: KENSINGTON-TALMADGE
LA MESA
OLD SAN DIEGO
OCEAN BEACH
MIDWAY PACIFIC HIGHWAY
UPTOWN
GREATER NORTH PARK
MID-CITY: CITY HEIGHTS
MID-CITY: EASTERN AREA
2
3
PENINSULA
BALBOA PARK
LEMON GROVE
SAN DIEGO BAY
DOWNTOWN
GREATER GOLDEN HILL
ENCANTO NEIGHBORHOODS
8
SOUTHEASTERN SAN DIEGO
4
BARRIO LOGAN
CORONADO
SKYLINE-PARADISE HILLS
NATIONAL CITY
CHULA VISTA
PACIFIC OCEAN
IMPERIAL BEACH
OTAY MESA-NESTOR
BROWN FIELD
OTAY MESA
TIJUANA RIVER VALLEY
SAN YSIDRO
MEXICO
AEROPUERTO DE TIJUANA
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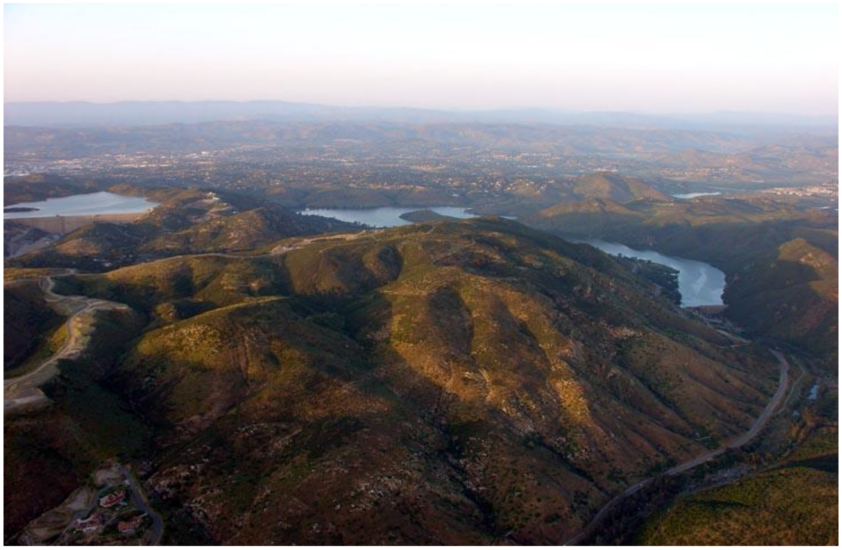
Appendix H: Public Outreach and Education

Section 1: Planning, Research and Monitoring

2011 Public Opinion Poll Report

The City sub-sample of the 2011 Public Opinion Poll Report can be found on the following pages. The appendix is not included in this document, but it can be found at http://www.sandiego.gov/water/waterreuse/demo/links.shtml.



SAN DIEGO COUNTY WATER AUTHORITY: 2011 PUBLIC OPINION POLL REPORT

CITY OF SAN DIEGO SUB-SAMPLE (n = 403)

Prepared for

City of San Diego
Public Utilities Department
600 B Street, Suite 600
San Diego, CA 92101

REA& PARKER RESEARCH
Survey/Market Research
Economic Consultants

Prepared by

Rea & Parker Research
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San Diego, CA 92142
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May 2011

Table of Contents

Executive Summary

The San Diego County Water Authority has conducted a public opinion survey within its service area in San Diego County in order to measure the region's opinion regarding various water related issues. Rea & Parker Research was selected to be the lead consultant for this 2011 Public Opinion Poll. Rea & Parker Research also conducted surveys for the Water Authority in 2000, 2003, 2004, 2005, 2006, 2008, and 2009. A portion of this public opinion poll, as in 2004, was specifically geared to residents within the City of San Diego. This 2011 study established the following as its primary objectives:

- the level of public concern about cost of water and rising rates
- tolerance for additional rate increases to support reliability projects
- drivers for recent reductions in water use
- likelihood for regional water use to "rebound"
- progress toward Strategic Plan objectives

The purpose of this report is to present the results of the San Diego County Water Authority 2011 Public Opinion Poll specifically for residents located within the City of San Diego.

The San Diego City portion of the survey was conducted by a random telephone sample of 403 respondents, which equates to a margin of error +/-4.9 percent @ 95 percent confidence. The sample included 45 residents who were only cell phone users (do not use land-line telephone). All participants were at least 18 years old and had lived in San Diego County at least one year.

Respondents are predominantly White (53 percent), with 28 percent Hispanic/Latino, 8 percent African-American/Black, 7 percent Asian/Pacific Islander, and 4 percent American Indian/Native American and Mixed Ethnicities. Residents earn a median household income of $52,200 per year (23 percent earning $100,000 or more and another 23 percent earning under $25,000). They have a median age of 48 years and have lived in the County for a median of 22 years.

Among respondents, 45 percent possess a Bachelor's Degree or more, with 27 percent having a High School education or less. The zip codes most represented in the survey are as follows: 92105 (7 percent), 92114, 92129, 92154 (6 percent each), 92115, and 92128 (5 percent each). Home ownership percentage is 62 percent, with a mean of 3.02 persons per household.

Survey Findings

The 2011 Public Opinion Poll focused on five essential topics. It sought to identify and analyze, in particular,

- the level of public concern about cost of water and rising rates
- tolerance for additional rate increases to support reliability projects
- drivers for recent reductions in water use
- likelihood for regional water use to "rebound"
- progress toward Strategic Plan objectives

As such, this report has been divided into six essential information components as follows:

- Opinions about Local Issues
- Value and Cost of Water
- Water Reliability, Diversification, and Rate Tolerance

- Attitudes about Water Conservation,
- Opinions about the Use of Recycled Water
- Attitudes about the Local Agricultural Industry and Water

Opinions about Local Issues

- Residents identified the most important issues in the City of San Diego as the Economy and Jobs (29 percent), Financial Problems in Government including high taxes (17 percent), and the Quality and Cost of Education (9 percent), followed by Gasoline Prices and Water Supply and Quality (each 7 percent). This focus on jobs and government financial problems is not surprising since, during this past year, there has been considerable, sustained attention devoted to the fiscal stress of local and state governments as well as the economy as a whole.
- Water Supply and Quality rose modestly in importance from 3 percent in 2004 to its current level of 7 percent.

Value and Cost of Water

- Water is seen as a relatively good value for the amount of money paid compared to other utilities such as gas and electric.
- Among all respondents, 31 percent viewed gas and electric service as the best value, followed by water at 23 percent. Among all City respondents, except those who do not pay their own water bill, water (26 percent) was rated as even a closer second to gas and electric (27 percent) in terms of value.
- Despite considering water to be a relatively high value utility, over one-half of the residents (52 percent) feel that the cost of water is too expensive.
- Over three-fifths are either very concerned or somewhat concerned about the increasing price of water.
- In order to minimize this high cost, residents are willing to consider replacing their lawn area with low water plants (27 percent) and collecting water from showers and reusing the grey water for other household uses (21 percent).

Water Reliability, Diversification, and Rate Tolerance

Water Reliability

- Among residents of City of San Diego, almost four-fifths (78 percent) find that the current supply of water is either very reliable or somewhat reliable. This positive attitude regarding water supply reliability represents a substantial increase from the results of the 2004 survey where 66 percent of the residents found the water supply to be very reliable or somewhat reliable.
- Residents feel that water supply reliability is largely staying the same (48 percent) and nearly one-fourth (24 percent) feel that it is improving.
- Residents indicate that the most critical thing can be done to ensure a safe and reliable water supply for San Diego County residents and businesses is conservation (25 percent) -- “voluntary conservation” (14 percent) and

mandatory conservation (11 percent) – followed by recycling (22 percent), and seawater desalination (13 percent).

- Regarding conservation, the current survey represents a 10 percent increase over the 2004 results (from 15 percent to 25 percent).
- Recycled water has grown in prominence as a critical issue during the current survey period – doubling from 11 percent in 2004 to 22 percent in 2011.
- While still a critical issue, desalinated water sustained a moderate decline in importance from 17 percent in 2004 to 13 percent in the current survey.

Diversification Plan and Rate Tolerance

- Four-fifths of San Diego City residents are in support of the San Diego County Water Authority's Diversification Plan that is intended to ensure the reliability of the County's water supply.
- Residents indicate that recycled water (28 percent) and seawater desalination (25 percent) are the two most important parts of the Plan.
- There is a near equal split in opinion about the necessity of water rate increases that may be necessary to pay for projects that are designed to improve water supply reliability, with 45 percent doubting that all the water projects are necessary and 44 percent feeling that increases in water rates are necessary to fund these projects that will maintain reliability of the water supply.
- As such, 43 percent of residents are willing to pay more per month for the Plan that is intended to ensure the reliability of the County's water supply. The median increase that respondents are willing to pay is $15 per month.

Water Conservation

Water Use in Past Year

- Water conservation is a significant component in San Diego County's water supply plans. Over one-fourth of respondents reported that their household water usage has decreased during the past year largely as a result of less outdoor watering (31 percent), taking shorter showers and not allowing the water to run unnecessarily (16 percent each).
- Among those who reduced their water usage, more than one-third were motivated to do so because of cost and household budgetary reasons, with another 14 percent sensitive to rising water rates. Almost one-third is conserving because it is "the right thing to do."
- The vast majority of those who have decreased their water usage in the past year (82 percent) indicated that their reduced water usage is permanent.
- Requests made by water agencies to residents in an effort to motivate them to conserve water have been successful – nearly three-fifths of respondents indicate that these requests have positively influenced them.
- Three-fourths of respondents think that using tiered water rates as a means to convince people to use water wisely is appropriate.

Water Use in the Future

- If current water restrictions are lifted, over four fifths of all respondents would continue to comply with these restrictions primarily because they feel it is a reasonable and proper ethic (49 percent of all respondents).
- It is most encouraging that when water agencies no longer take an active role in restricting water use, all respondents indicate that they are not likely to increase their water use to a great extent (20 percent). On the other hand, a less cool and less wet year would lead to more than half (52 percent) of the respondents returning to a higher usage than they incurred during the past year.

Water Conservation as a Civic Responsibility

- Residents compared water conservation with other civic responsibilities. Voting in public elections, not littering or polluting, and recycling used materials are seen as more of one's civic responsibility than conserving water. Water conservation is seen as more of a civic responsibility than serving on a jury.

Opinions about the Use of Recycled Water

Recycled Water

- Support for the use of recycled water to supplement drinking and household water supplies is strong.
- Two-thirds of respondents believe that it is possible to further treat water used for irrigation to make the water pure and safe for drinking.
- Nearly one half of the respondents (47 percent) think that drinking water already contains recycled water. These respondents think that drinking water already contains recycled water because they heard news stories, the smell and taste of the water is bad, or they can see recycling plants and assume that they are being used for drinking water.
- Over two-thirds of respondents either strongly favor or somewhat favor advanced treated recycled water as an addition to the supply of drinking water – a dramatic increase over the results of the 2004 survey where only 26 percent of respondents indicated a favorable rating.
- It is noteworthy that that over one-half of those who were originally not strongly in favor of using recycled water for drinking purposes would find it acceptable as a drinking water supply supplement if it received advanced treatment and if certain other safety measures were assured. This is an increase of about 15 percent over the approximately 35 percent who changed their mind in 2004 as a result of these additional considerations.

City of San Diego Water Purification Demonstration Project

- Four-fifths (80 percent) of San Diego City residents have not heard about the City of San Diego Water Purification Demonstration Project. Among these residents 11 percent have heard about the Project and know that it involves recycled water for drinking and household use.

- When the Project was explained to the respondents, they expressed strong support – over three-fourths indicating a favorable rating.

Attitudes about the Local Agricultural Industry and Water

- San Diego City residents have shown substantial support for their agricultural community – nearly four-fifths feel that local farmers and agriculture are very important to the local economy.
- Residents further feel, to a large extent (84 percent) that reduced water rates for the agricultural industry should be maintained.

Introduction and Methodology

The San Diego County Water Authority has, over the years, conducted a public opinion survey within its service area in San Diego County in order to measure public opinion regarding water issues. Rea & Parker Research was selected to be the lead consultant for this 2011 Public Opinion Poll. Rea & Parker Research, in association with Flagship Research, also conducted public opinion polls for the Water Authority in 2000, 2003, 2004, 2005, 2006, and 2009 and two water conservation surveys in 2008 to test the effectiveness of conservation messages. This continuity of survey administration greatly facilitates the tracking of responses from year-to-year, including the consistency of wording and interviewing that adds to the statistical reliability of such comparisons.

The City of San Diego requested that the sample include about 400 respondents specifically residing within the boundaries of the City. It was also requested by the City of San Diego that specific questions pertaining only to City residents be included in the survey. This same request was made in 2004 by the City of San Diego. Accordingly, Rea & Parker Research has compared 2004 survey data with the results of the current survey where questions were the same or nearly the same.

The purpose of this report is to present the results of the San Diego County Water Authority 2011 Public Opinion Poll for respondents located within the City of San Diego.

The 2011 Public Opinion Poll focused on five essential topics. It sought to identify and analyze, in particular,

- the level of public concern about cost of water and rising rates
- tolerance for additional rate increases to support reliability projects
- drivers for recent reductions in water use
- likelihood for regional water use to "rebound"
- progress toward Strategic Plan objectives

As such, this report has been divided into six essential information components as follows:

- Opinions about Local Issues
- Value and Cost of Water
- Water Reliability, Diversification, and Rate Tolerance
- Attitudes about Water Conservation,
- Opinions about the Use of Recycled Water including the City of San Diego Water Purification Demonstration Project
- Attitudes about the Local Agricultural Industry and Water

Sample

The 2011 Public Opinion Poll was conducted during late March and early April, 2011 by a random telephone sample of 403 respondents located within the City of San Diego. The random sample was selected by random digit dialing from the zip codes contained within the City of San Diego. This sample yields a margin of error of +/- 4.9 percent @ 95 percent confidence. The sample includes 45 residents who are only cell phone users (do not use land-line telephone). All participants were at least 18 years old and had lived in San Diego County at least one year. It is important to note that the sample of 403 is a subset of the larger sample of 821 representing the entire San Diego Water Authority service area.

The margin of error for this survey represents the widest interval that occurs when the survey question represents an approximate 50%-50% proportion of the sample. When it is not 50 percent-50 percent, the interval is somewhat smaller. For example, in the survey findings that follow, 75 percent of respondent households believe that using tiered water rates as a means to convince people to use water wisely is appropriate. This means that there is a 95 percent chance that the true proportion of the total population within the City of San Diego who believe tiered water rates are appropriate is between 70.1 percent and 79.9 percent (75 percent +/- 4.9 percent).

Survey Instrument

The survey instrument contained 52 questions, including 69 individual survey items (variables). The survey instrument was administered in both English and Spanish. A copy of the survey is attached in the Appendix. A total of 65 respondents (16.0 percent) elected to respond in Spanish. The number of respondents who wished to take the survey in Spanish in the current survey is considerably higher than in 2004 when 7 percent preferred to respond to the survey in Spanish. The Cooperation Rate (Complete/Known Eligibles + Proportionate Share of Refusals) for the survey was 79.6 percent. . Mean survey administration time was 22 minutes per respondent.

Respondent Characteristics

Table 1 presents certain demographic characteristics of the survey respondents and also provides the 2004 characteristics for comparative purposes. In 2011, over one-half of the respondents are White (53 percent), with 28 percent Hispanic/Latino, 8 percent African-American/Black, 7 percent Asian/Pacific Islander, and 4 percent American Indian/Native American and Mixed Ethnicities. Residents earn a median household income of $52,200 per year (23 percent earning $100,000 or more and another 23 percent earning under $25,000). They have a median age of 48 years and have lived in the County for a median of 22 years. Among respondents, 45 percent possess a Bachelor’s Degree or more, with 27 percent having a High School education or less. The zip codes most represented in the survey are as follows: 92105 (7 percent), 92114, 92129, 92154 (6 percent each), 92115, and 92128 (5 percent each). Home ownership percentage is 62 percent, with a mean of 3.02 persons per household. Among White and Asian respondents, 72 percent are homeowners; Black/African-American homeowners are 45 percent; and Hispanics/Latinos have 40 percent homeowners.

Table 1 City of San Diego Survey Respondent Demographics		
Demographic Characteristic	**2011**	**2004**
Gender		
Male	45%	51%
Female	55%	49%
Median Age (Years)	48	47
Median Number of Years Lived in Community	22	22
Highest Grade/Level of School Completed		
High School or Less	27%	16%
Some College	28%	32%
Bachelor's Degree	28%	25%
Some Graduate School	17%	27%
Ethnicity		
White	53%	63%
Latino/Hispanic	28%	17%
African-American/Black	8%	7%
Asian/Pacific Islander	7%	9%
Native American/Mixed	4%	4%
Median Household Income	$52,200	$57,700
Home Ownership Percentage	62%	70%
Type of Housing		
Single Family Detached	60%	
Condominium	18%	
Apartment	20%	
Mobile Home	2%	
Mean Number of Persons per Household	3.02	2.75
Major Residential Zip Codes		
92105	7%	5%
92114	6%	
92129	6%	6%
92154	6%	5%
92115	5%	6%
92128	5%	
Pay Own Water Bill	72%	69%
Preferred Language—Spanish	16%	7%

Differences between the current 2011 survey respondents and the respondents from the 2004 survey are as follows:

- 2011 survey respondents have completed less higher education than respondents in 2004.
- 2011 respondents are less represented by Whites and more represented by Hispanics/Latinos than the respondents in 2004, representing the increasing size of the Hispanic/Latino population and a greater willingness to participate.

- The percentage of homeowners (62 percent) is generally lower than in 2004—reflecting the growth in Hispanic/Latino participation and current home ownership/foreclosure problems. Yet, a somewhat larger proportion of households pay their own water bill (72 percent) than in 2004 instead of having it paid by a landlord or homeowners association, for example.
- The number of persons per household has increased to above 3 persons

Survey Findings

Each section of the report will begin with a very brief abstract, or summary of highlights within the ensuing section, in order to orient the reader to what is to follow. Charts have been prepared for each section that depict the survey results for the 2011 survey and for the 2004 where questions have been repeated and can be directly compared. Each section will include a discussion of the findings from the 2011 survey, with key comparisons drawn regarding results from 2004. Detailed statistical frequency distributions are contained in the Appendix.

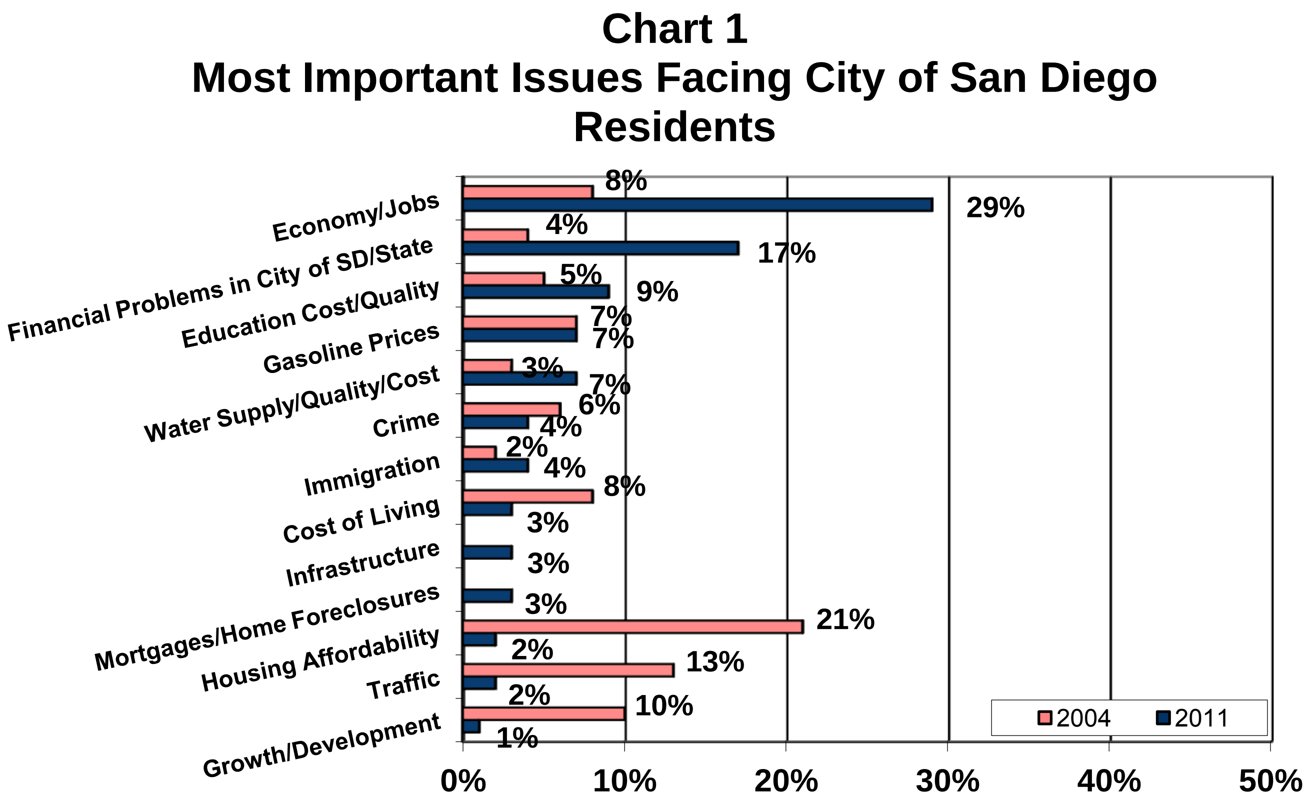
Lastly, subgroup analyses for different age groups, various levels of education, gender, home ownership/rental status, household size, residential tenure in the community, different income categories, and water bill payers/non-payers and ethnicity of residents of the City of San Diego will be presented in a succinct, bulleted format when statistical significance and relevance warrants such treatment.

Opinions about Local Issues

SUMMARY: Residents identified the most important issues in the City of San Diego as the Economy and Jobs (29 percent), Financial Problems in Government including high taxes (17 percent), and the Quality and Cost of Education (9 percent), followed by Gasoline Prices and Water Supply and Quality (each 7 percent).

Chart 1 shows that the most important current issues identified by residents of the City of San Diego are the Economy and Jobs (29 percent), Financial Problems in the City of San Diego and the State including high taxes (17 percent), and the Quality and Cost of Education (9 percent), followed by Gasoline Prices and Water Supply and Quality (each 7 percent). This focus on jobs and government financial problems is not surprising, since, during this past year, there has been considerable attention devoted to the fiscal stress of local and state governments as well as problems in the economy as a whole. Water Supply and Quality rose in importance from 3 percent in 2004 to its current level of 7 percent.

In 2004, respondents indicated that the most important issues were housing affordability (21 percent) traffic (13 percent), and growth and development (10 percent). Other responses that did not receive enough mention to merit an individual listing in the chart can be viewed in the Appendix, where the full listing of responses is displayed.



Value and Cost of Water

<u>Summary:</u> Water is seen as a relatively good value for the amount of money paid compared to other utilities such as gas and electric. Among all respondents, 31 percent viewed gas and electric service as the best value, followed by water at 23 percent. Among all City respondents, except those who do not pay their own water bill, water (26 percent) was rated as even a closer second to gas and electric (27 percent) in terms of value. Despite the high value attributed to water, however, over one-half of the residents feel that the cost of water is too expensive.

<u>Relative Value of Water and Other Utilities</u>: Residents were asked their opinion regarding the utility that provides them with the best value for the money paid. **Chart 2** shows the survey results for all residents in the City of San Diego. Among all respondents, 31 percent viewed gas and electric service as the best value, followed by water at 23 percent. Among all City respondents, except those who do not pay their own water bill (**Chart 3),** water (26 percent) was rated as even a closer second to gas and electric (27 percent).

It should be noted that **Charts 2 and 3** show two percentages for each utility -- one percentage represents the utility of first choice among the respondents and the second percentage represents a composite weighting that takes the first, second, and third rankings for each utility into account. For example, in **Chart 3**, it is shown that residents rated gas and electric (27 percent first choice; 27 percent weighted choice) as the utility with the best value for the amount of money paid and water (26 percent first choice; 23 percent weighted choice) as the second best value.

The following subgroups are more likely to believe that water is a good value for the money paid:

- Older residents (75 years of age and older – 33 percent versus under 75 years of age – 21 percent).
- Residents of single family homes (27 percent) and mobile homes (25 percent) versus residents of apartments (15 percent).
- Those who prefer to communicate in Spanish (33 percent) versus those who prefer English (21 percent).
- Residents who pay their own water bill (26 percent) versus those whose landlord pays their water bill (14 percent).

The following subgroups are more likely to believe that gas and electric is a good value for the money paid:

- Younger residents (18 – 24 years of age – 60 percent versus 25 years of age and older – 29 percent).
- Residents of condominiums (30 percent) and single family homes (25 percent) versus residents of apartments (49 percent) and mobile homes (50 percent).
- Those who prefer to communicate in Spanish (41 percent) versus those who prefer English (29 percent).
- Homeowners whose water bill is paid by the landlord (47 percent) versus homeowners who pay their own water bill (27 percent).

Cost of Water: Chart 4 demonstrates that, despite its high degree of valuation, more than one-half (52 percent) of respondents feel that the cost of water is too expensive and another 42 percent feel that the cost is fair and reasonable. **Chart 5** reports the level of resident concern regarding the prospect of continued increases in water rates. This concern was measured on a 5-point scale, where 1 = not at all concerned to 5 = very concerned. Over three fifths (61 percent) recorded ratings of very concerned (48 percent) and somewhat concerned (13 percent). The mean rating is 3.73 is indicative of a higher level of concern and this is consistent with the relatively high percentage of respondents who feel the cost of water is too expensive.

Chart 2
Best Values Among Utilities

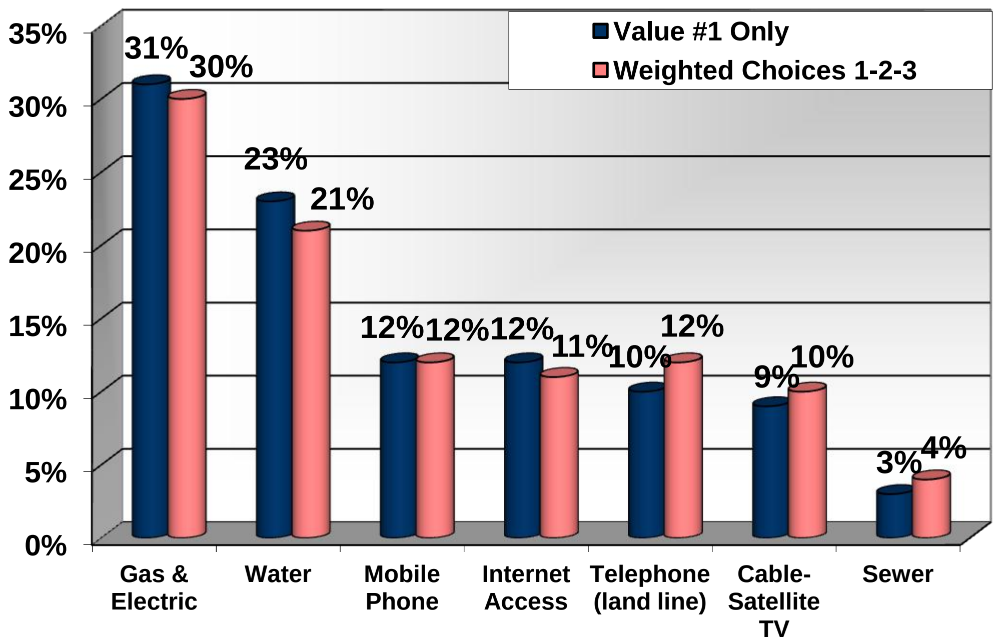


Chart 3
Best Values Among Utilities
(Water bill payers only)

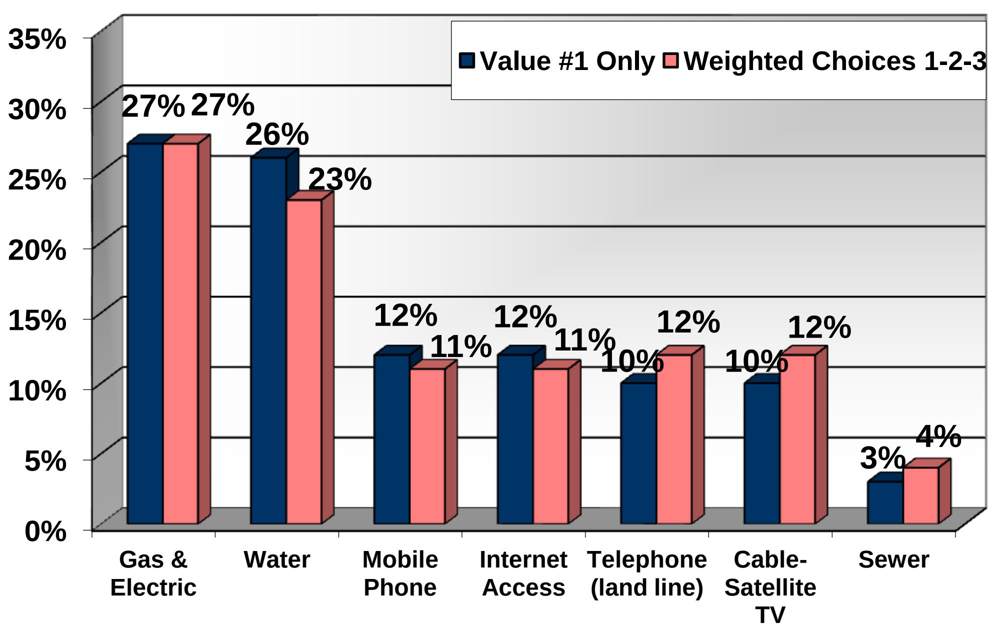


Chart 4
Cost of Water

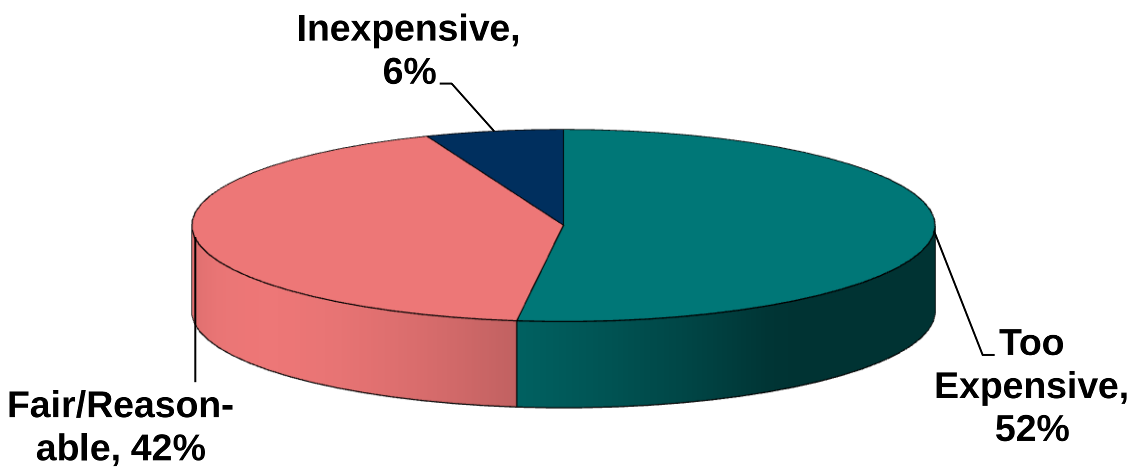
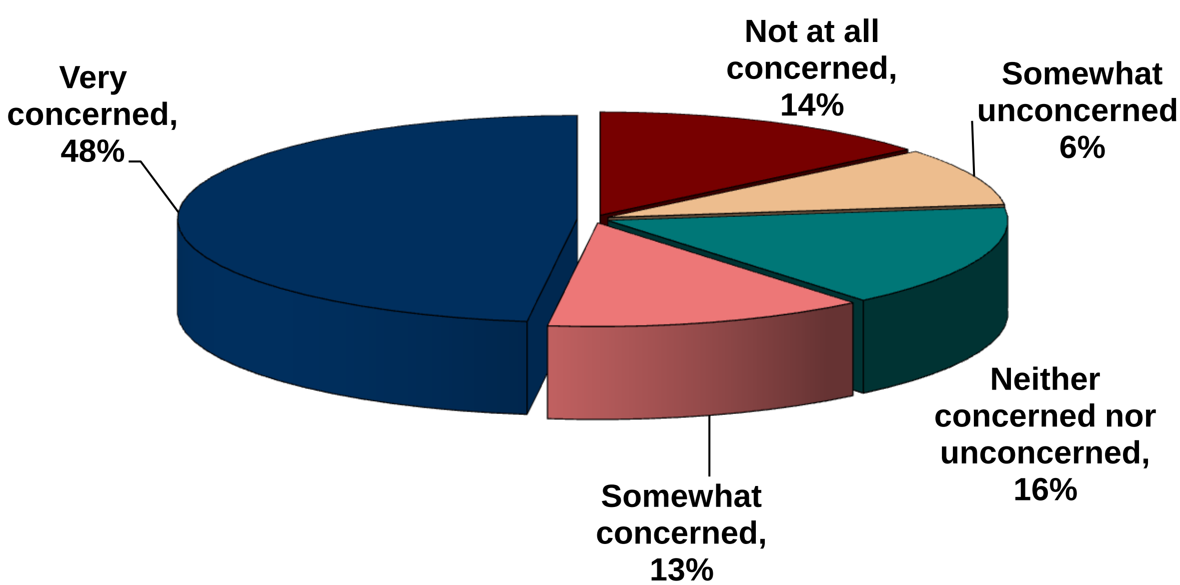


Chart 5
Concern About Continued Increases in Water Rates

(scale: 1=not at all concerned.....5=very concerned--mean = 3.73)



The following subgroups believe that the cost of water is too expensive:

- African-Americans (57 percent) versus Whites (46 percent), Asians (48 percent), and Latinos (51 percent).
- Residents of apartments (51 percent) and single family homes (48 percent) as opposed to residents of mobile homes (22 percent).
- Spanish speaking respondents (57 percent) versus English speaking residents (45 percent).
- Household members who pay their own water bill (51 percent) as opposed to the residents whose landlord pays the water bill (41 percent).

The following groups differ regarding their level of concern about the prospect of continued increases in water rates. The differences are expressed in terms of mean scores that are based on a scale of 1 to 5, where 1 = not at all concerned, 2 = somewhat unconcerned, 3 = neither concerned nor unconcerned, 4 = somewhat concerned, and 5 = very concerned.

- African-Americans (mean of 4.20) and Whites (mean of 3.81) are more concerned about water rate increases than are Latinos (3.42).
- Smaller household sizes are more concerned about water rate increases than are larger households (2 persons per household – mean of 3.99 and 3 person households – mean of 3.89 versus 5 person households – mean of 3.31).

In order to minimize increases in water rates, 27 percent indicated that they were willing to replace their lawn area with low water plants; another 21 percent were willing to collect grey water from showers and reuse the water for other household uses. Beyond these two actions, residents expressed further interest in replacing grass with artificial turf (16 percent) and making use of high-efficiency irrigation systems (15 percent) (**Chart 6**).

The following subgroups are more likely to replace their lawn area with low water plants as the one thing they would do in order to minimize increases in water rates.

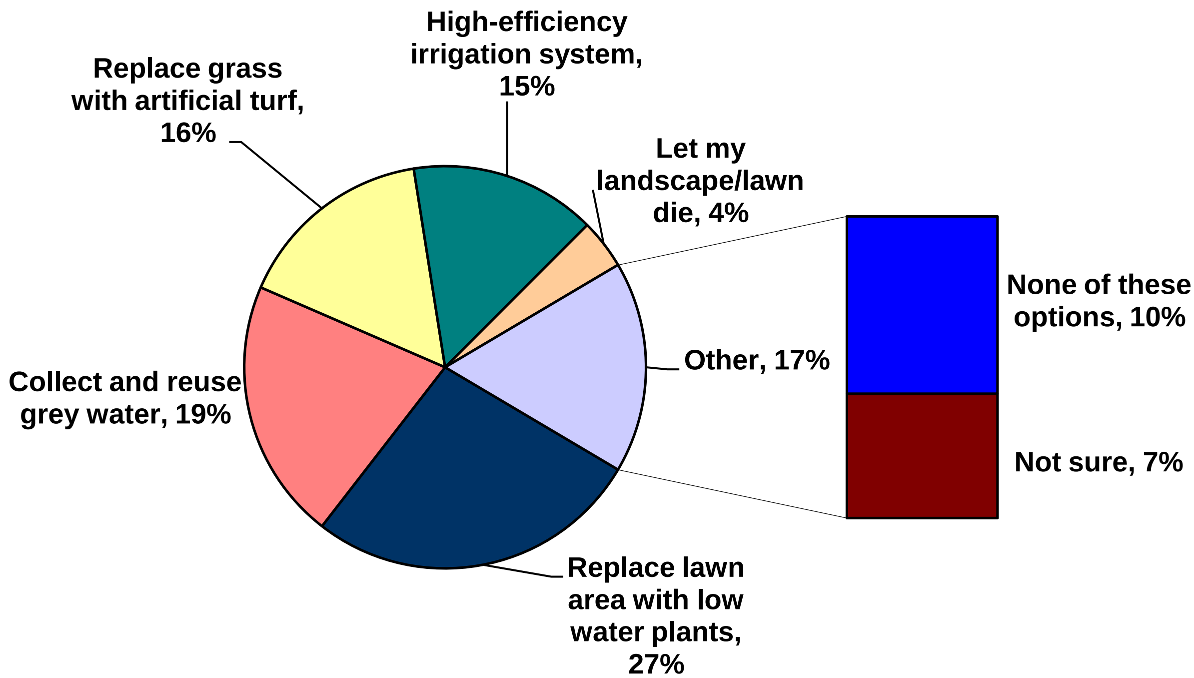
- Latino residents (31 percent) and White residents (28 percent) versus African- Americans (13 percent) and Asians (17 percent).

The following subgroups are more likely to collect water from other household uses and reuse the water as the one thing they would do in order to minimize increases in water rates:

- Asian residents (28 percent) and Latino residents (26 percent) versus African-Americans (17 percent) and Whites (18 percent).

- Spanish speaking residents (29 percent) versus English speaking residents (19 percent).

Chart 6
Willingness to Undertake the Following in Order to Minimize Increases in Water Rates



Water Reliability, Diversification and Rate Tolerance

SUMMARY: Among residents of the City of San Diego, nearly four-fifths find that the current supply of water is either very reliable or somewhat reliable. This positive attitude toward water supply reliability represents a substantial increase from the results of the 2004 survey where 59 percent of the residents found the water supply to be very reliable or somewhat reliable. Residents indicate that the most critical thing that can be done to ensure a safe and reliable water supply for San Diego County residents and businesses is conservation followed by water recycling and water desalination.

Four-fifths of the residents are in support of the San Diego County Water Authority's Diversification Plan that is intended to ensure the reliability of the County's water supply. There is a near equal split in opinion about the necessity of water rate increases to pay for projects designed to improve water supply reliability. More than 40 percent of residents are willing to pay more per month for the Plan. The median increase that respondents are willing to pay is $15 per month.

Water Reliability: **Chart 7** shows that among residents of the City of San Diego, nearly four-fifths (78 percent) find that the current supply of water is either very reliable (44 percent) or somewhat reliable (34 percent). This positive attitude toward water supply reliability represents a substantial increase from the results of the 2004 survey where 59 percent of the residents found the water supply to be very reliable or somewhat reliable.

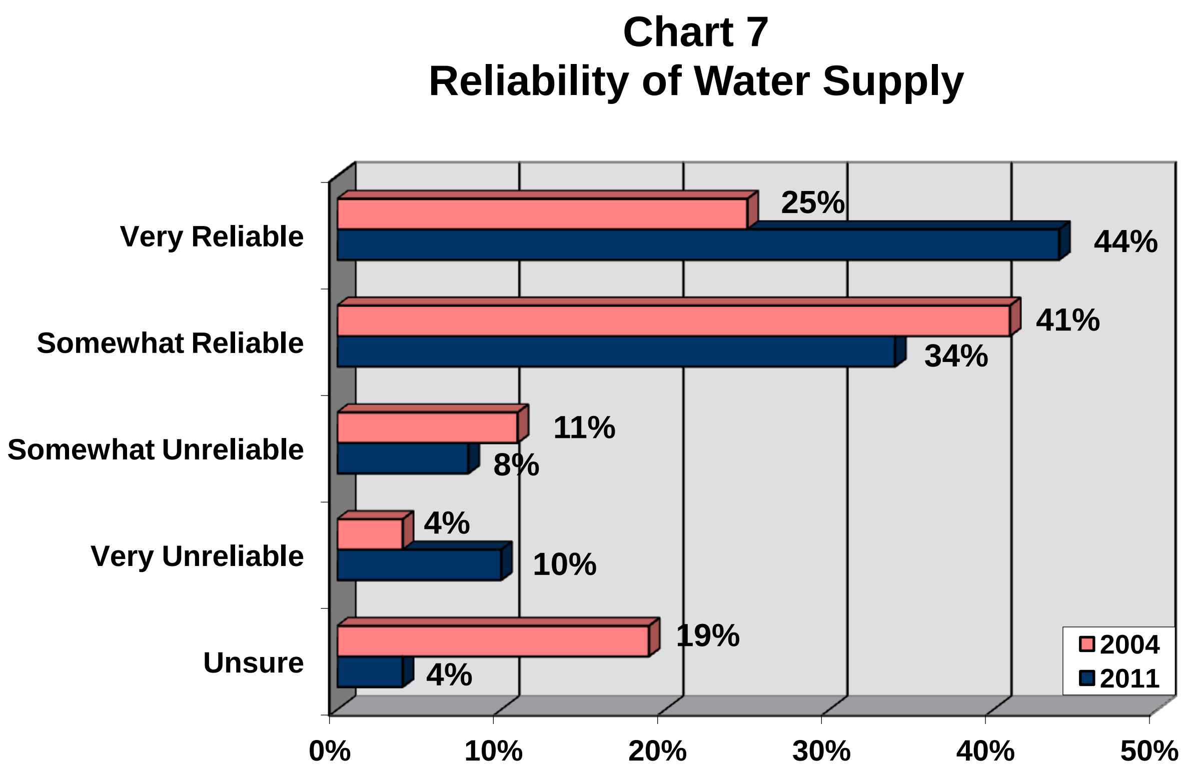


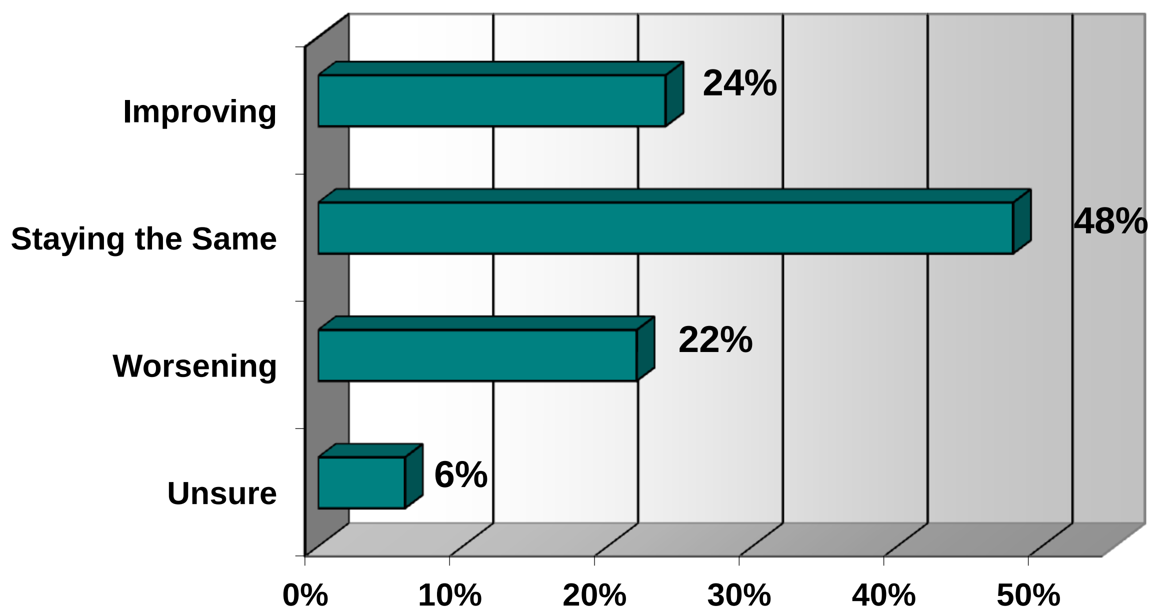
Chart 8 shows that confidence in the water supply is generally stable (48 percent feel that water supply reliability is staying the same) or improving (24 percent). Approximately one-fifth (22 percent) of the residents believe that the water supply reliability is worsening.

The following groups are less sure that reliability is improving:

- Residents who prefer to communicate in Spanish (37 percent) versus those who prefer to communicate in English (21 percent).
- Residents with one year of graduate school or more education (39 percent) versus those who have a bachelor's degree or less education (19 percent).
- White residents (27 percent0 versus Black residents (3 percent).

When respondents were asked what they think is the most critical thing that can be done to ensure a safe and reliable water supply for San Diego County residents and businesses, 25 percent indicated some form of conservation – either voluntary (14 percent) or mandatory (11 percent). This represents a 10 percent increase from the 2004 survey where 15 percent of respondents, at that time, indicated that conservation (mandatory and voluntary conservation was not specified) was the most critical thing that would ensure the reliability of the water supply. In the current survey, "recycled water" (22 percent) followed conservation as a critical thing that would ensure water reliability – doubling the response to recycled water in the 2004 survey. Desalination, which was high on the list in 2004 at 17 percent, fell to some extent in the current survey to 13 percent (**Chart 9**).

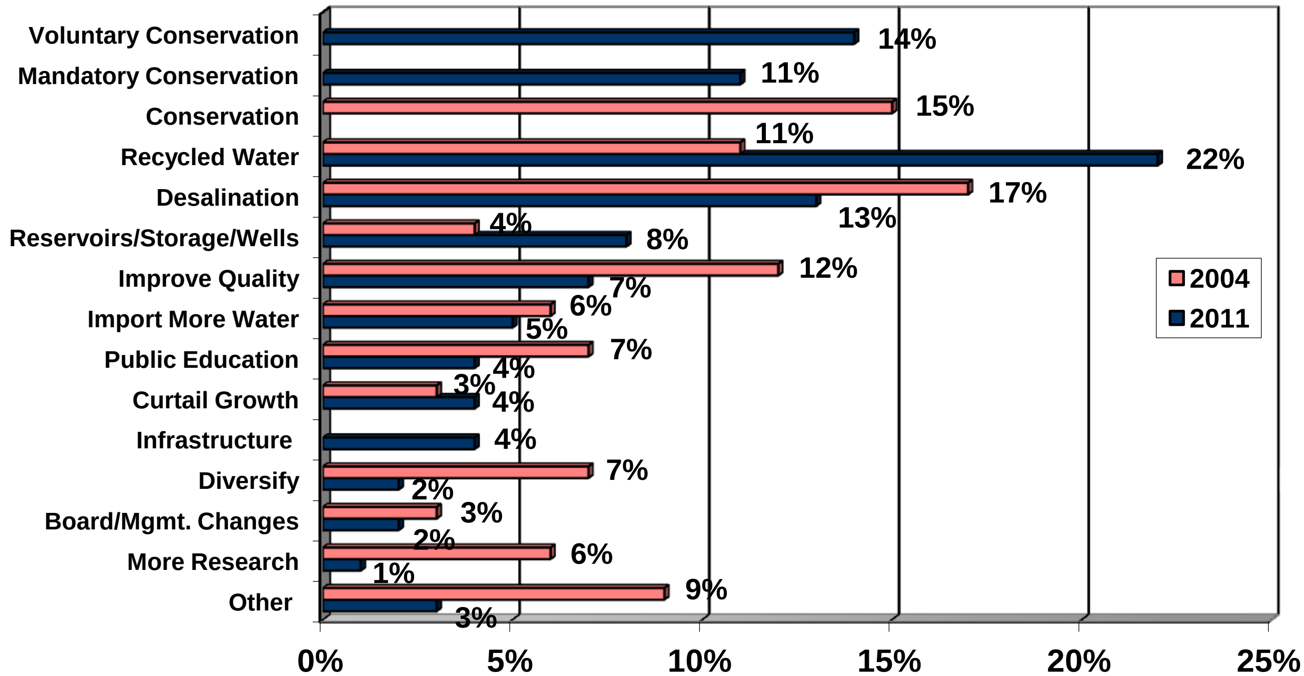
Chart 8
Water Supply Reliability Improving/Worsening



The following subgroups are more likely to think that mandatory conservation is the single most critical thing that can be done to ensure a safe and reliable water supply for San Diego County residents and businesses:

- African-American residents and Hispanic residents (each 17 percent) versus White residents (7 percent).
- Shorter term residents of the County as opposed to longer term residents (1 – 5 years – 22 percent versus 6 years or more – 9 percent).
- Renters (15 percent) versus homeowners (9 percent).

Chart 9
Most Critical Thing that Can be Done to Ensure Safe and Reliable Water Supply for San Diego County



The following subgroups are more likely to think that voluntary conservation is the single most critical thing that can be done to ensure a safe and reliable water supply for San Diego County residents and businesses:

- Residents of condominiums (17 percent) versus residents of apartments and single family homes (12 percent each).
- Spanish speaking residents (18 percent) versus English speaking residents (13 percent).
- Whites (15 percent) and Latinos (14 percent) versus African-Americans (6 percent).

The following subgroups are more likely to think that water recycling is the single most critical thing that can be done to ensure a safe and reliable water supply for San Diego County residents and businesses:

- Spanish speaking residents (41 percent) versus English speaking residents (18 percent).
- Latinos (36 percent) versus Whites (18 percent) and African-Americans (17 percent).
- Residents of apartments (35 percent) versus residents of single family homes (21 percent) and condominiums (17 percent).

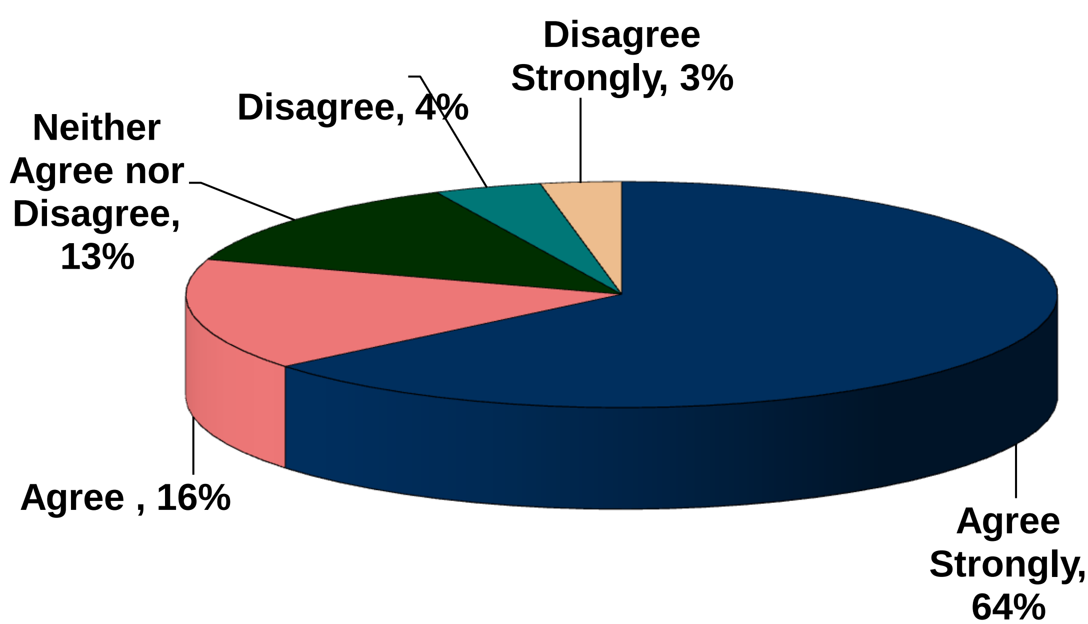
- Renters (27 percent) versus homeowners (9 percent).

The following subgroups are more likely to think that desalination is the single most critical thing that can be done to ensure a safe and reliable supply for San Diego County residents:

- Homeowners (16 percent) versus renters (8 percent).
- Longer term residents of the County as opposed to shorter term residents (26 or more years – 19 percent versus 25 years or less – 9 percent).
- Residents of condominiums (20 percent) versus residents of apartments (5 percent).
- White residents (16 percent) versus African-American and Latino residents (6 percent each).

Diversification Plan and Rate Tolerance: **Chart 10** shows that four-fifths (80 percent) of City of San Diego residents are in support of the San Diego County Water Authority's Diversification Plan with ratings of strongly agree (64 percent) and agree (16 percent). The mean rating of 1.66 (based on a scale of 1 to 5, where 1 = strongly agree and 5 = strongly disagree) underscores this high level of support for the Diversification Plan. Residents indicate that the most important part of the Diversification Plan is recycled water (28 percent) followed by seawater desalination (25 percent) **(Chart 11).**

Chart 10
Opinion about Diversification Plan
(scale: 1= Agree Strongly..5= Disgaree Strongly---mean = 1.66)



The following subgroups are more likely to believe that seawater desalination is the most important part of the diversification plan:

- Residents with more education as opposed to those with less education (bachelor's degree or more – 31 percent versus less than a bachelor's degree – 20 percent).
- Males (34 percent) versus females (18 percent).
- English speaking residents (27 percent) versus Spanish speaking residents (12 percent).

The following subgroups are more likely to believe that recycled water is the most important part of the Diversification Plan:

- Residents with less education as opposed to those with more education (high school or less – 45 percent versus 1 year of college or more – 22 percent).
- Spanish speaking residents (55 percent) versus English speaking residents (23 percent).

Chart 11
Most Important Component of Diversification Plan

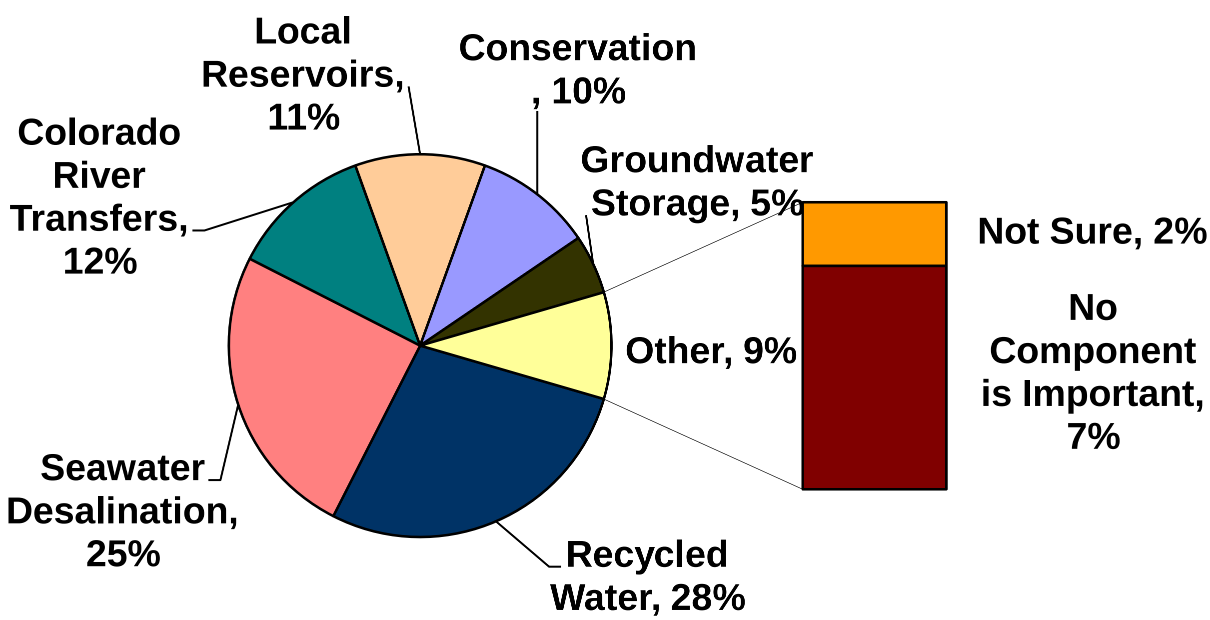


Chart 12 shows that among the 43 percent of residents who are willing to pay more per month for diversification and ultimately water supply reliability, 26 percent of them (11 percent of the total population) are willing to pay an additional $6 to $10 per month and 21 percent (9 percent of the total

population) are willing to pay an additional $11 to $20 per month. The median increase that respondents indicate a willingness to pay is $15 per month.

- Larger household sizes are willing to pay more than smaller household sizes to support diversification.

Chart 13 shows that there is a near equal split in opinion about the necessity of water rate increases to pay for projects designed to improve water supply reliability, with 45 percent feeling that water rates are too high and doubt that these water projects are necessary and 44 percent feeling that increases in water rates are necessary to maintain reliability of the water supply.

- Residents who prefer to communicate in Spanish (64 percent) are more likely to oppose water rate increases than those who prefer English (42 percent).
- Individuals who rent their home tend to oppose water rate increases more so than do those who own their homes (rent – 53 percent versus own – 42 percent).
- Respondents who have lived in the County for less than 40 years (50 percent) are more likely to oppose water rate increases than those who have lived in the County for more than 40 years (32 percent).

Chart 12
Willingness to Pay More per Month for Diversification Plan
(43 percent of the 72 percent who pay their own bill are willing to pay more: median = $15)

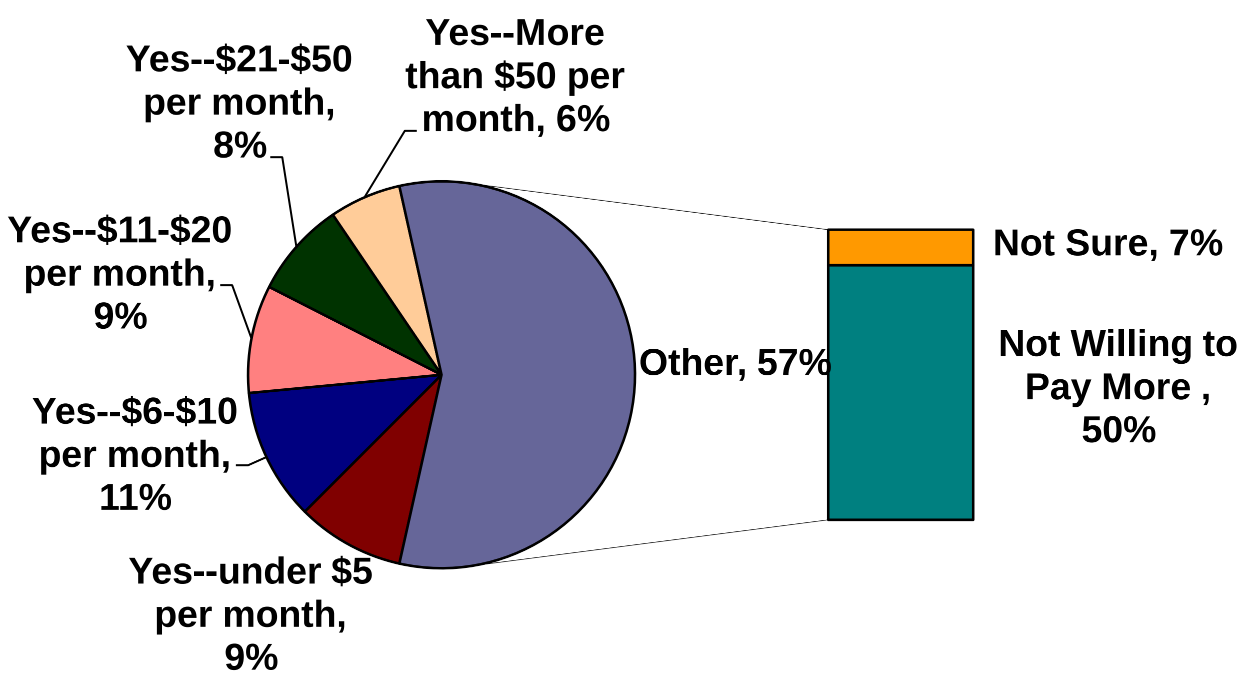
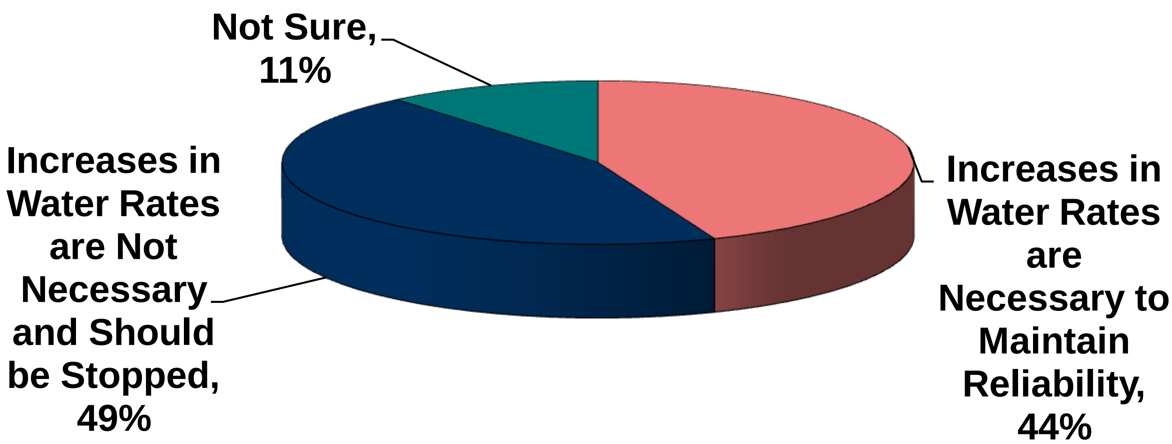


Chart 13
Support for Increased Water Rates to Pay for Projects to Improve Reliability
(among 72 percent who pay their own bills)



Attitudes about Water Conservation

SUMMARY: Water conservation is a significant component in San Diego County's water supply plans. Over one-fourth of respondents reported that their household water usage has decreased during the past year largely as a result of less outdoor watering, taking shorter showers and not letting the water run unnecessarily. Among those who reduced their water usage, almost one-half were motivated to do so for financial reasons ("we are watching our budget" = 35 percent and "rising water rates" = 14 percent). Another one–third (31 percent) felt that conservation is the "right thing to do". The vast majority—over four-fifths—indicated that their reduced water usage is permanent.

It is most encouraging that when water agencies no longer take an active role in restricting water use, respondents who have reduced their water usage during the past year indicate that they are not likely to increase their water use (20 percent). On the other hand, a less cool and less wet year would lead to more than half (52 percent) of those who have reduced their water use during the past year returning to higher usage. Among all respondents, whether they have reduced their use in past year or not, if water restrictions are lifted, over four-fifths would continue to comply with these restrictions primarily because they feel it is a reasonable and proper ethic or residents have learned to live with less water.

Requests made by water agencies to residents in an effort to motivate them to conserve water have been successful – nearly three-fifths of respondents indicate that these requests have strongly influenced them. Three-fourths (75 percent) of respondents think that using tiered water rates as a means to convince people to use water wisely is appropriate.

Residents compared water conservation with other civic responsibilities. Voting in public elections, not littering or polluting, and recycling used materials are seen as more of one's civic responsibility

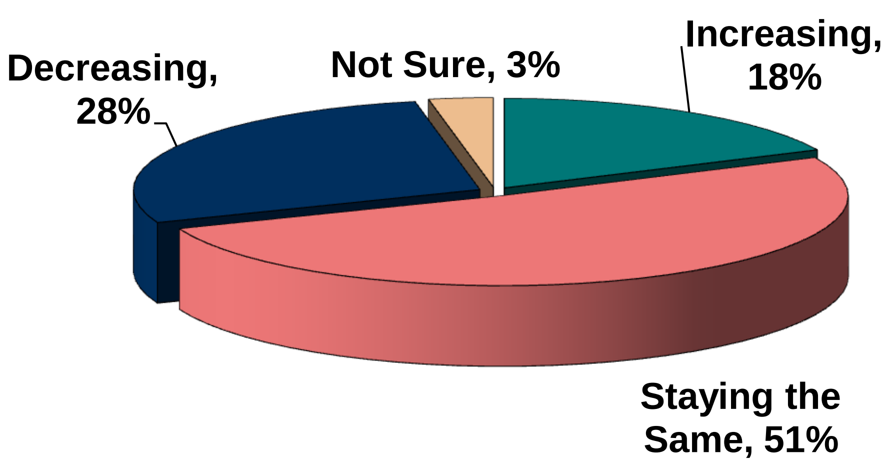
than conserving water. Water conservation is seen as more of a civic responsibility than serving on a jury.

Water Use in the Past Year: **Chart 14** shows that over one-fourth of respondents (28 percent) indicated that their household water usage has decreased over the past year. Among those who indicated that their household water usage has decreased, nearly one-third (31 percent) indicated that they did less watering outdoors. Others indicated that they take shorter showers and they do not allow the water to run unnecessarily (16 percent each) (**Chart 15).**

The following subgroups are more likely to indicate that their household water use has decreased over the past year:

- Whites (32 percent) and Hispanics (29 percent) versus African-Americans (10 percent).
- Residents with higher income levels as opposed to those with lower income levels ($75,000 or more – 38 percent versus under $75,000 – 27 percent).
- Residents who pay their own water bills (33 percent) versus residents whose landlords or homeowners association pays the water bill (18 percent).
- Larger household sizes as opposed to smaller household sizes (6 or more persons per household – 45 percent—versus 1 person per household and 2 persons per household – 7 percent each.

Chart 14
Water Use Increasing or Decreasing Past Year



The following subgroups tend to reduce their water usage by using less water outdoors:

- Homeowners who pay their own water bill (36 percent) versus homeowners whose landlord pays their water bill (6 percent).
- Residents of single family homes (40 percent) versus residents of apartments (8 percent) and condominiums (7 percent).
- Residents who prefer to communicate in English (35 percent) versus those who prefer Spanish (12 percent).
- Homeowners (40 percent) versus those who rent their homes (12 percent).

The following subgroups tend to reduce their water usage by taking shorter showers:

- Residents of apartments and mobile homes (33 percent each) versus residents of single family homes (12 percent) and condominiums (21 percent).
- Residents who prefer to communicate in Spanish (41 percent) versus those who prefer English (12 percent).
- Renters (38 percent) versus those who own their home (8 percent).

The following subgroups tend to reduce their water usage by not allowing the water to run unnecessarily:

- Residents whose landlord pays the water bill (47 percent) versus residents who pay their own water bill (10 percent).
- Renters (19 percent) versus those who own their own home (13 percent).

Chart 15
Major Step by Household to Reduce Water Use in Past 6 Months

(among 28 percent of households that indicated decreasing water usage)

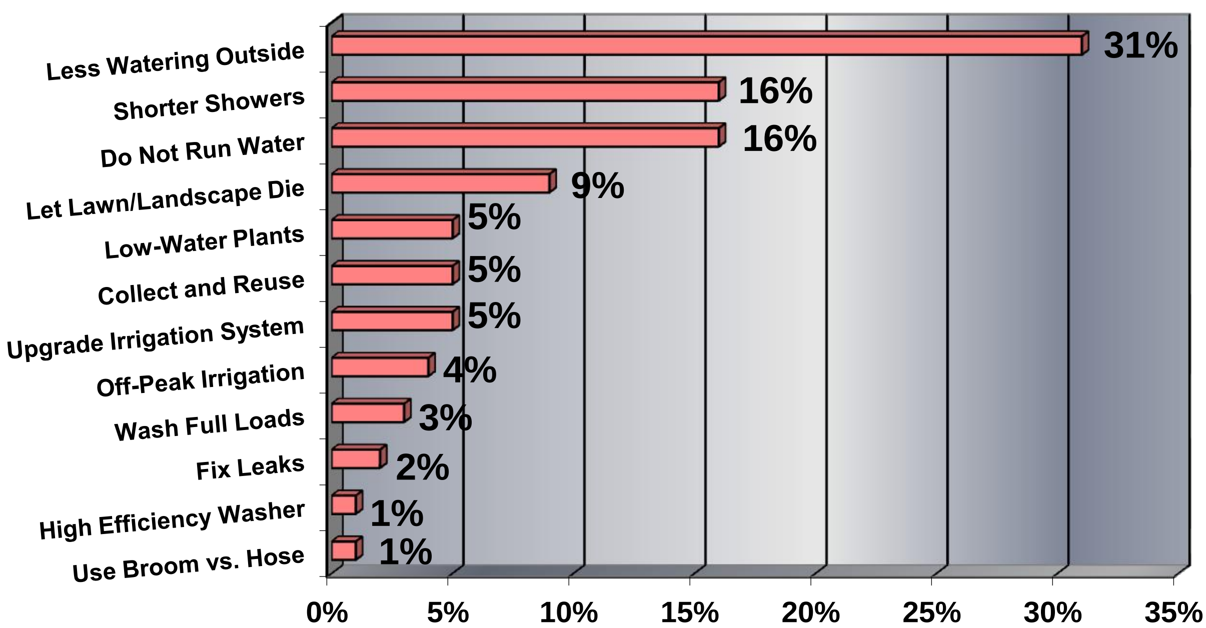


Chart 16 indicates that among those who indicated that their household water usage has declined, nearly one-third (35 percent) were motivated to reduce water usage through their interest in saving money plus 14 percent who indicated an awareness of increasing water rates. Another 31 percent felt that reducing water usage is the "right thing to do." Among those who indicated that their household water usage has declined, a large majority (82 percent) think that their reduced use of water is permanent while 15 percent think their reduction is temporary (**Chart 17**).

The following subgroup is motivated to reduce its household water usage because it is "the right thing".

- Residents whose landlord pays their water bill (67 percent) versus residents who pay their own water bill (26 percent).

The following subgroup is particularly motivated to reduce their household water usage because they are trying to save money:

- Residents who pay their own water bill (40 percent) versus residents whose landlord pays their water bill (7 percent).

Chart 16
Primary Motivation for Water Use Reduction
(among 28 percent of households that have reduced water use in past year)

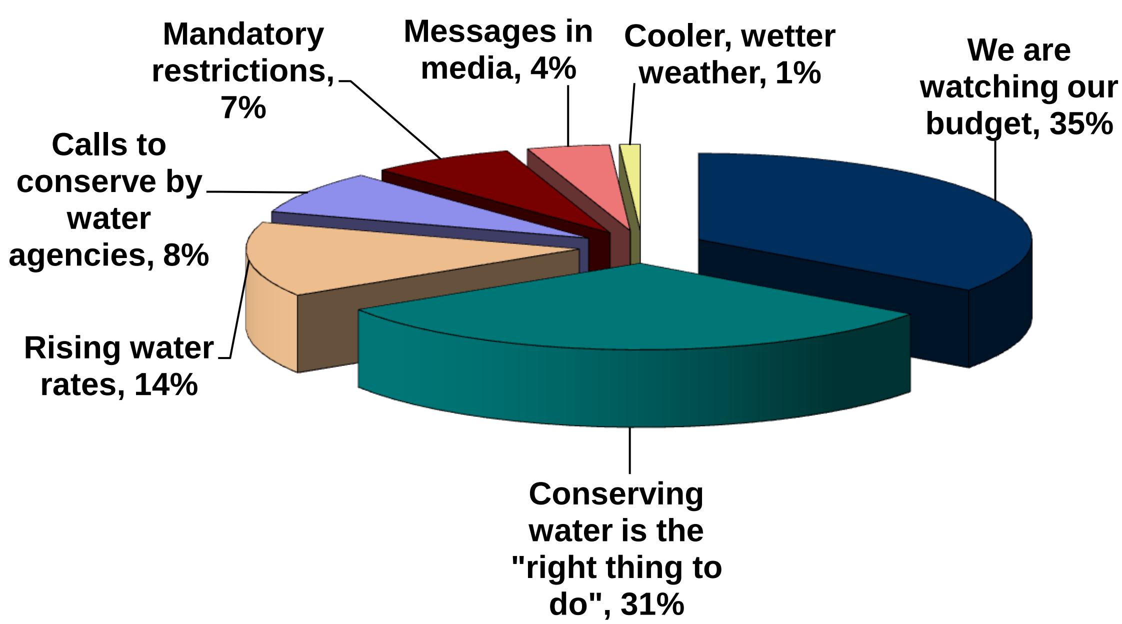


Chart 17
Is Reduced Use Permanent?
(among 28 percent of households that indicate reduced water usage in past year)

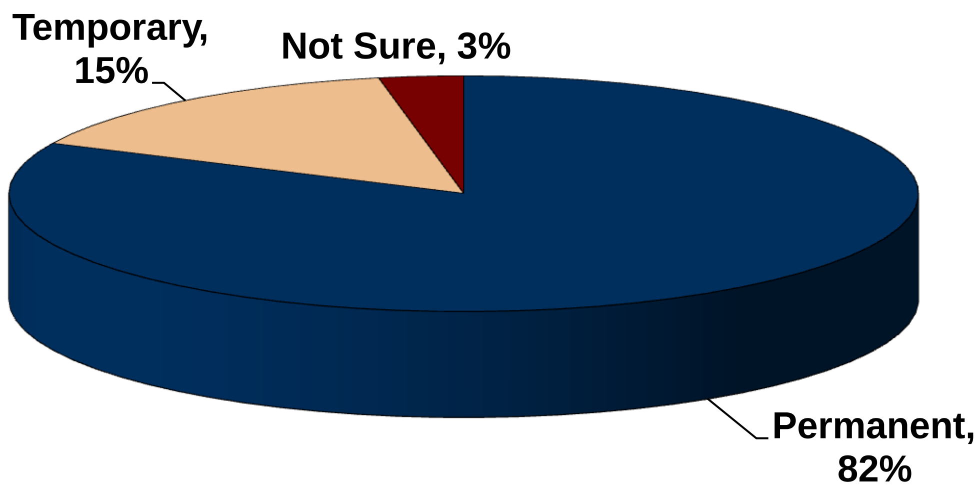
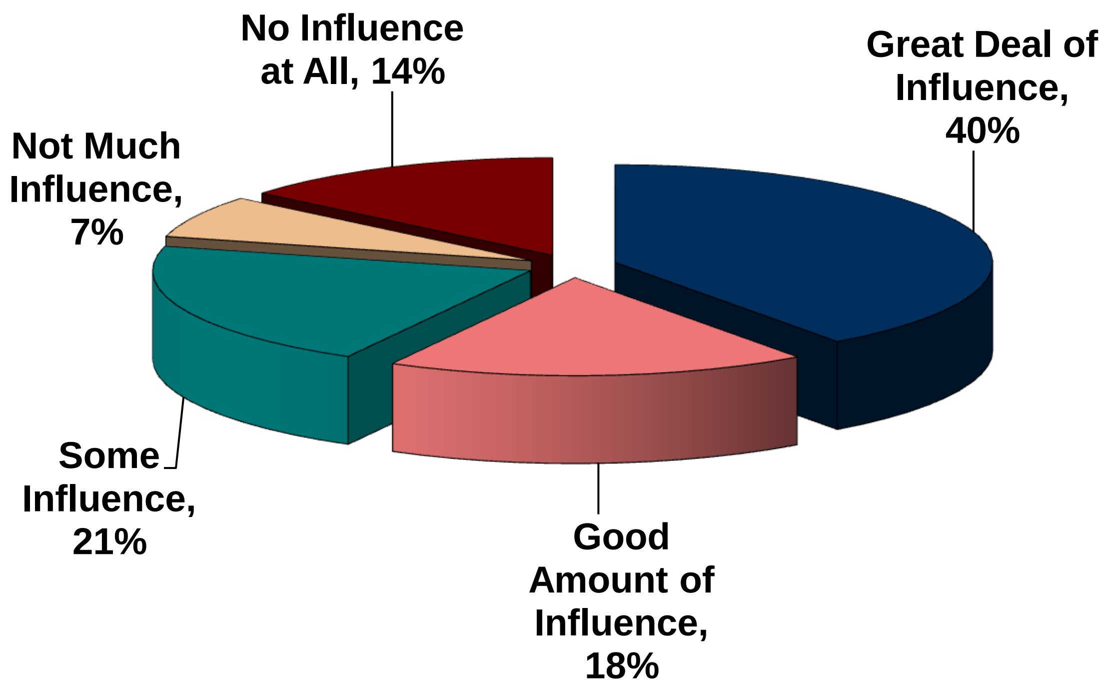


Chart 18 reports the impact that, among all respondents, requests for increased voluntary conservation made by water agencies have had on residents' water use. Nearly three-fifths of respondents (58 percent) indicate that these requests have a great deal of influence (40 percent) or a good amount of influence (18 percent). On a scale of 1 to 5, where 1 = a great deal of influence and 5 = no influence at all, the mean rating measuring the impact of these calls is 2.36, indicating that these call messages are working relatively well. **Chart 19** shows that three-fourths (75 percent) think that water agencies' use of tiered water rates as a means to convince people to use water wisely is appropriate.

The following groups differ with regard to the impact they feel water agencies have in motivating people to pursue voluntary conservation. The differences are expressed in terms of mean scores that are based on a scale of 1 to 5, where 1 = a great deal of influence, 2 = a good amount of influence, 3 = some influence, 4 = not much influence, and 5 = no influence at all.

- Residents with a higher level of education are less influenced by water agency calls than are residents with a lower level of education (1 year of graduate school or more – mean of 2.85 versus less than a bachelor's degree – mean of 2.21).
- Larger household sizes tend to be influenced by agency calls more so than smaller household sizes (4 persons per household – mean of 2.04 and 5 persons per household – mean of 2.19 versus 1-to-3 person households -- mean of 2.75 for both 1 and 2 person households and 3 person households – mean of 2.58).
- Homeowners (mean of 2.30) are more likely to be influenced by agency calls than are renters (mean of 2.45).

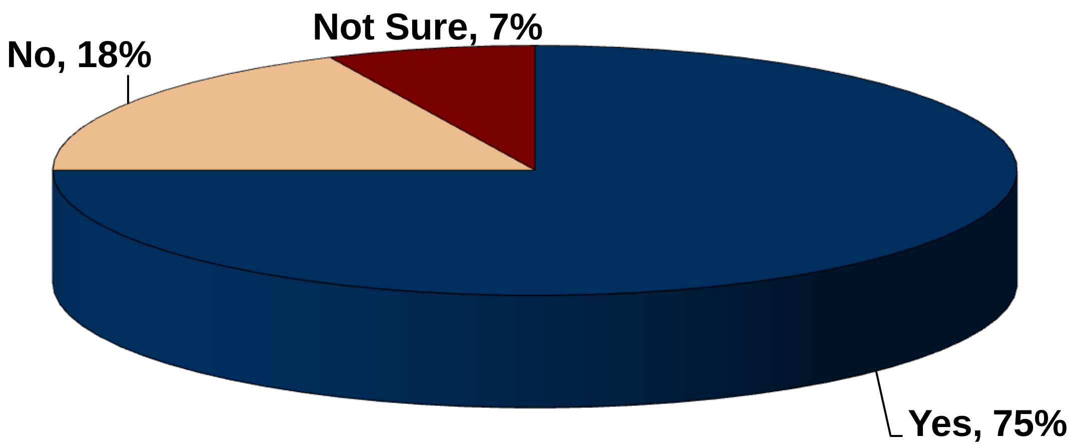
Chart 18
Influence of Requests for Voluntary Conservation from Water Agencies
(Scale: 1=Great Deal of Influence..5=No Influence at All---mean = 2.36)



The following subgroups tend to favor using tiered water rates as a means of convincing people to use water wisely.

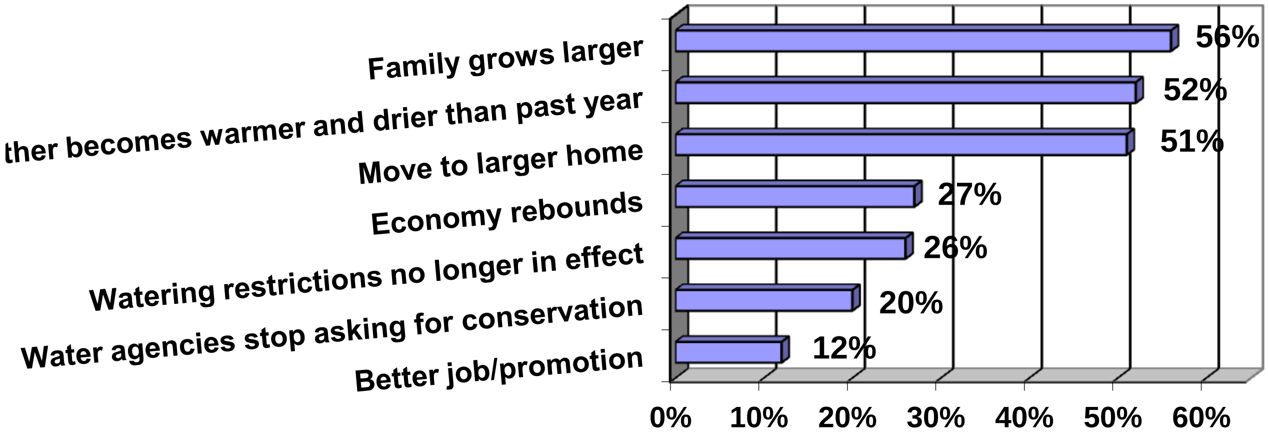
- Lower income residents as opposed to higher income residents (under $50,000 – 83 percent versus $50,000 and over – 68 percent).
- Renters (81 percent) versus homeowners (70 percent).

Chart 19
Appropriateness of Tiered Water Rates to Encourage Using Water Wisely



Water Use in the Future: Respondents were asked to indicate if they will or might increase their water usage if various conditions and situations were to prevail. Among the findings reported in **Chart 20**, it is most encouraging that when water agencies no longer take an active role in restricting water use, respondents indicate, to a great extent, that they are not likely to increase their water usage (20 percent). Similarly, when water agencies stop asking for residents to practice conservation there is no surge in water use expected (26 percent). On the other hand, a less cool and less wet year would lead to more than one half (52 percent) of the respondents returning to higher usage. Understandably, as family size grows larger, respondents indicate that they will increase water usage (56 percent) and, similarly, respondents are likely to increase water use when they move to a larger home (51 percent). When the economy rebounds (27 percent) or the respondent obtains a better job or a job promotion (12 percent), residents indicate that they are not likely to increase their water usage to a great extent.

Chart 20
Conditions Under Which Respondents Would Increase Water Use



The following subgroups are more inclined to increase their water usage when the weather becomes warmer and drier:

- Asians (76 percent) and African-Americans (73 percent) versus whites (44 percent).
- Residents who indicate that their reduced use of water is temporary (65 percent) as opposed to permanent (55 percent).

The following subgroups are more likely to increase their water usage when the economy rebounds:

- Residents with less education as opposed to residents with more education (less than a bachelor's degree – 34 percent versus bachelor's degree or more education – 17 percent).
- Asian residents (48 percent) and Latino residents (41 percent) versus White residents (16 percent).
- Spanish speaking residents (45 percent) versus English speaking residents (23 percent).
- Residents who indicate that their reduced water use is temporary (41 percent) as opposed to permanent (17 percent).

The following subgroups are more likely to increase their water usage when their family grows in size:

- Younger residents as opposed to older residents (18 – 24 years of age – 88 percent versus 25 years of age and over – 55 percent).
- Asian residents (83 percent) versus White residents (50 percent).
- Larger household sizes as opposed to smaller household sizes (3 or more persons per household – 69 percent versus 1 and 2 persons per household – 59 percent).

- Shorter term residents of the County as opposed to longer term residents (15 years and under – 70 percent versus 16 years and over – 47 percent).
- Residents who believe that their reduced water use is temporary (71 percent) as opposed to permanent (50 percent).

The following subgroups are more likely to increase their water usage when they get a better job or promotion:

- Homeowners whose landlord pays their water bill (18 percent) versus homeowners who pay their own water bill (10 percent).
- Younger residents as opposed to older residents (18- 24 years of age – 41 percent versus 25 years of age and over – 11 percent).
- Spanish speaking residents (25 percent) versus English speaking residents (10 percent).
- Residents who believe that their reduced water use is temporary (18 percent) as opposed to permanent (10 percent).

The following subgroups are more likely to increase their water usage when watering restrictions are no longer in effect:

- Younger residents as opposed to older residents (18- 24 years of age – 59 percent versus 25 years of age and over – 24 percent).
- Residents with less education as opposed to those with more education (bachelor's degree or less – 28 percent versus 1 year of graduate school or more – 15 percent).
- Asian residents (48 percent) versus White residents (17 percent).
- Residents who believe that their reduced use of water is temporary (35 percent) as opposed to permanent (23 percent).

The following groups are more likely to increase their water usage when they move to a larger home:

- Younger residents as opposed to older residents (34 years of age and under – 64 percent versus 35 years of age and over – 47 percent).
- Asian residents (72 percent) versus White residents (45 percent).
- Residents of condominiums (67 percent) versus residents of mobile homes (44 percent) and single family homes (43 percent).
- Renters (60 percent) versus homeowners (45 percent).
- Residents who believe that their reduced use of water is temporary (65 percent) as opposed to permanent (47 percent).

The following subgroup is more likely to increase their water usage when agencies stop asking them to conserve water:

- Less educated (bachelor's degree or less – 22 percent) versus 1 year of graduate school or more – 10 percent).

According to **Chart 21**, if mandatory water restrictions are lifted, over four-fifths (81 percent) of all survey respondents (whether or not they have reduced their usage in the past year) would continue to comply with these restrictions, and 9 percent are unsure. The main reasons cited by respondents for continuing to comply with water restrictions once they have been lifted are presented in **Chart 22**. The dominant response is that saving and conserving water is a reasonable and proper ethic (49 percent of the 81 percent so inclined = 40 percent of all respondents. The second highest response is that residents have learned to live with less water (24 percent of 81 percent = 19 percent of all respondents). **Chart 23** shows that there are three main reasons why residents will not continue to observe restrictions once they are lifted. These residents indicate that they need more water for their landscape, lawn, and garden (26 percent) and they provide the rationale that if restrictions are not mandatory, then conservation must not be necessary and they generally want to use more water (each 22 percent).

Chart 21
Continue to Observe Restrictions Even if Lifted?

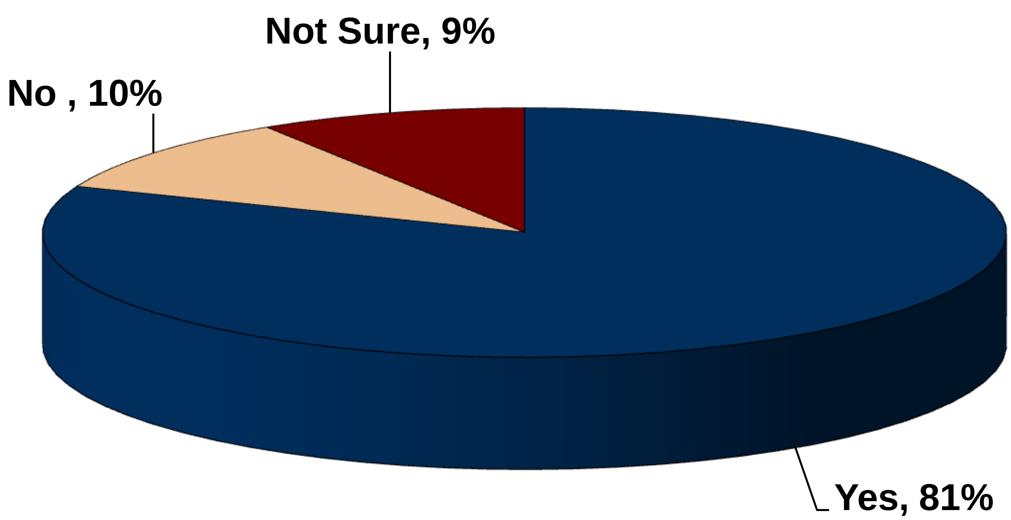


Chart 22
Reasons for Continuing to Conserve after Restrictions Lifted
(among 81 percent who indicated that they would continue to observe restrictions)

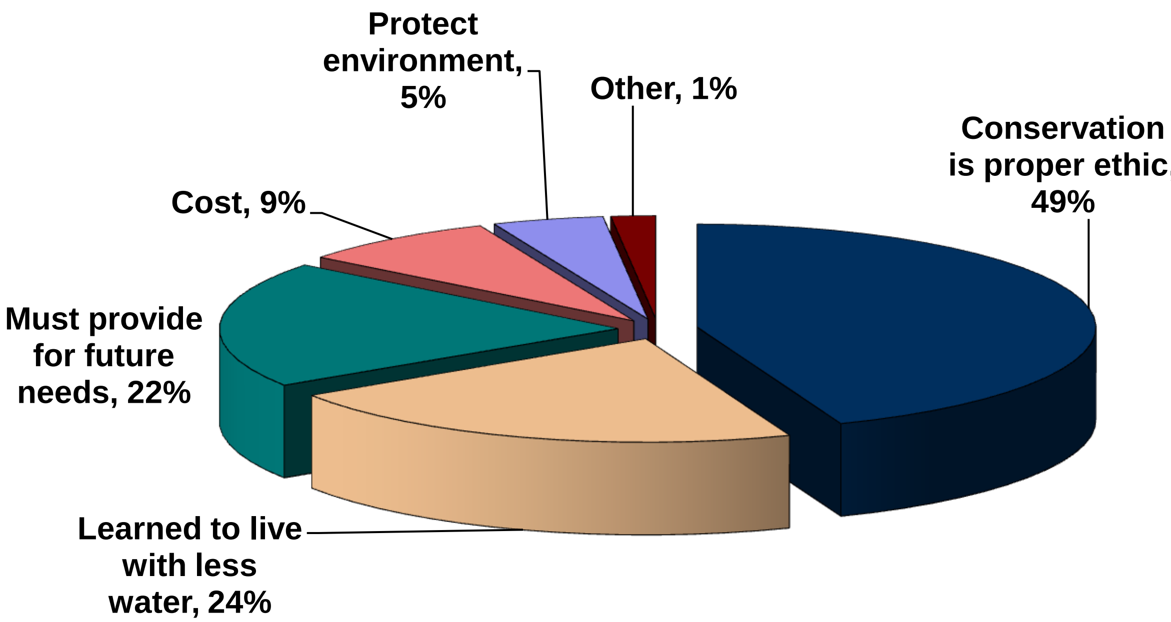


Chart 23
Reasons to Not Continue Observing Restrictions
(among 10 percent who indicated that they will not continue)

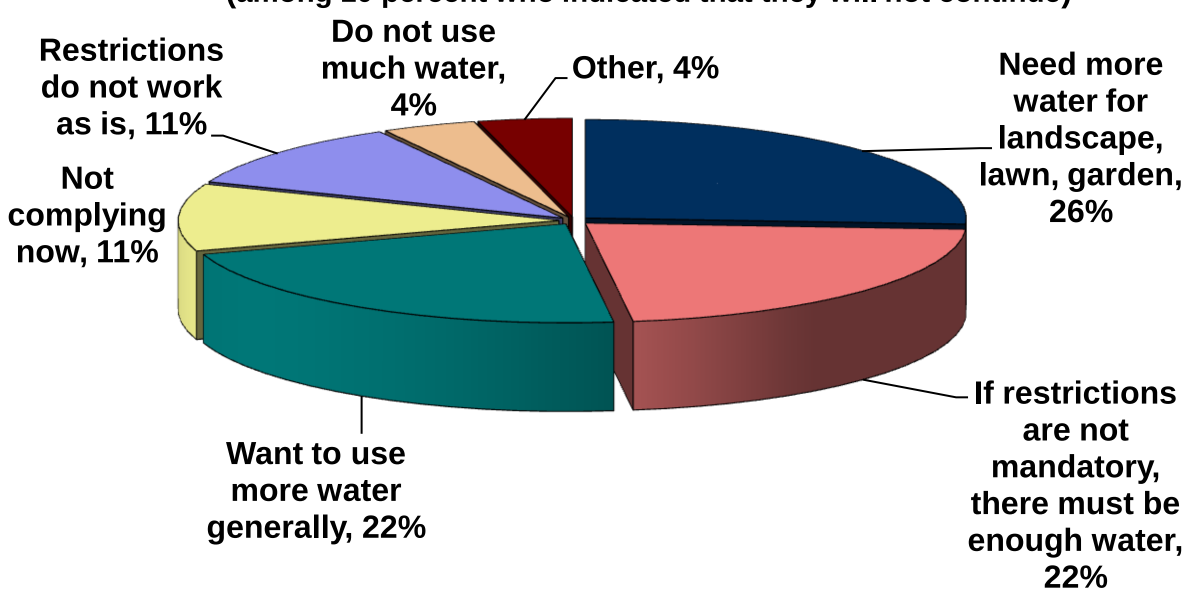
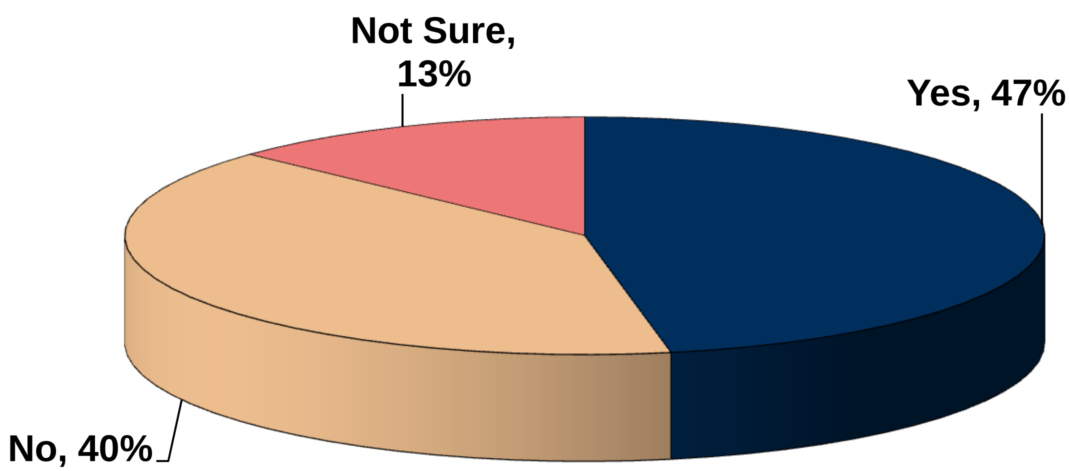


Chart 24 shows that nearly one-half (47 percent) of respondents think that water use restrictions should be made permanent in San Diego County regardless of the current year's water supply conditions; 40 percent do not think restrictions should be made permanent and 13 percent are unsure.

The following subgroups think that water use restrictions should be made permanent in San Diego County regardless of the current years' water supply conditions:

- Residents with less education as opposed to those with a higher level of education (less than a bachelor's degree – 54 percent versus a bachelor's degree or more or more – 41 percent).
- Lower income residents (under $25,000 – 68 percent versus $25,000 and above – 41 percent).
- Residents who prefer to communicate in Spanish (66 percent) versus residents who prefer English (44 percent).

Chart 24
Make Restrictions Permanent



Water Conservation as a Civic Responsibility: Chart 25 shows the extent to which respondents feel that certain activities are regarded as their civic responsibility. The chart further indicates whether these activities are more or less of a civic responsibility than is conserving water. It is noteworthy that, among the civic activities mentioned, the one that has the highest indication of being a civic responsibility is recycling used materials (84 percent). Respondents accorded serving on a jury the lowest level of civic responsibility (61 percent). Voting in public elections, not littering or polluting, and recycling used materials are seen as more of a civic responsibility than conserving water**.** Water conservation is seen as more of a civic responsibility than serving on a jury**.**

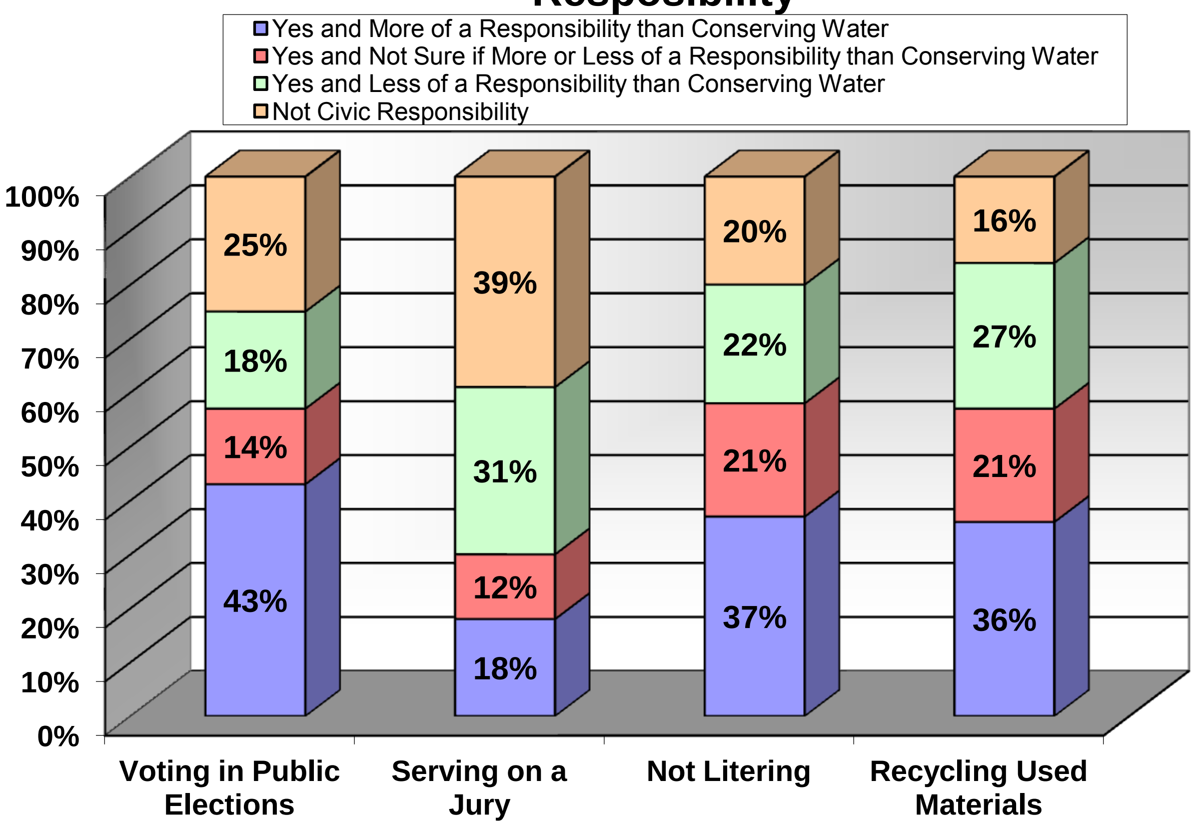
The following subgroup is somewhat more inclined to feel that preventing pollution and not littering is less of a civic responsibility than conserving water:

- English speaking residents (30 percent) versus Spanish speaking residents (15 percent).

The following subgroup is somewhat more inclined to feel that recycling used materials is more of a civic responsibility than conserving water:

- Spanish speaking residents (65 percent) versus English speaking residents (39 percent).

Chart 25
Water Conservation as a Comparative Civic Resposibility



Recycled Water

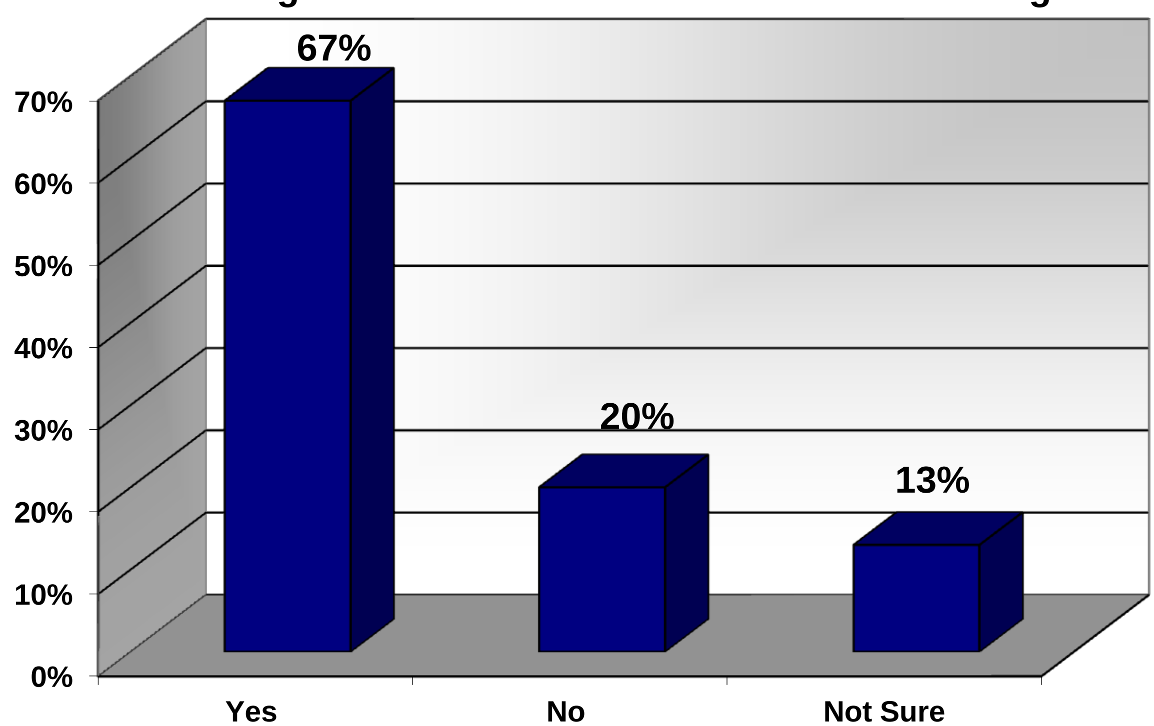
SUMMARY: Support for the use of recycled water to supplement drinking and household water supply is strong. Two-thirds of respondents believe that it is possible to further treat water used for irrigation to make the water pure and safe for drinking. Over two-thirds of respondents either strongly favor or somewhat favor advanced treated recycled water as an addition to the supply of drinking water.

It is noteworthy that that over one-half of those who were originally not strongly in favor of using recycled water for drinking purposes would find it acceptable if the water received advanced treatment and if certain other safety measures assured. This is an increase of about 15 percent over the approximately 35 percent who similarly changed their mind in 2004 as a result of this additional information.

Four-fifths (80 percent) of San Diego City residents have not heard about the City of San Diego Water Purification Demonstration Project. Among these residents, 11 percent have heard about the Project and know that it involves recycled water for drinking and household use. When the Project was explained to them, residents expressed strong support – over three-fourths indicating a favorable rating.

Recycled Water for Drinking and Household Use: **Chart 26** shows that two-thirds (67 percent) of respondents believe that it is possible to further treat recycled water used for irrigation to make the water pure and safe for drinking.

Chart 26
Possible to Further Treat Recycled Water Used for Irrigation to Make It Pure and Safe for Drinking

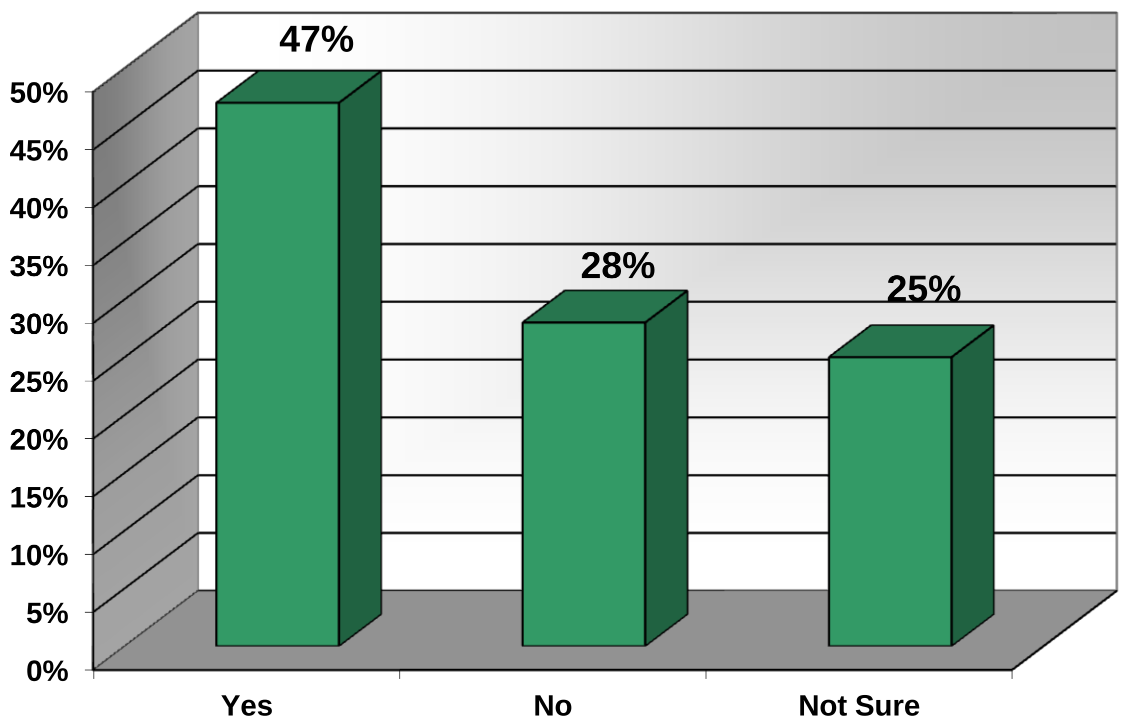


The following groups tend to believe more strongly that it is possible to further treat recycled water used for irrigation to make water pure and safe for drinking:

- Residents whose landlord pays the water bill (74 percent) versus homeowners who pay their own water bill (66 percent).
- Respondents who rent their home (75 percent) versus those who own their home (62 percent).

Chart 27 indicates that just under one-half of the respondents (47 percent) believe that drinking water already contains recycled water. Among the 47 percent of respondents who think that drinking water contains recycled water, three primary reasons are provided to explain why they feel this way. Respondents hear that water is recycled from news stories (21 percent), water tastes and smells bad (19 percent), and respondents see signs, recycling plants and know that such technology is available—the combination of which leads them to believe that it is being implemented already (14 percent) (**Chart 28**).

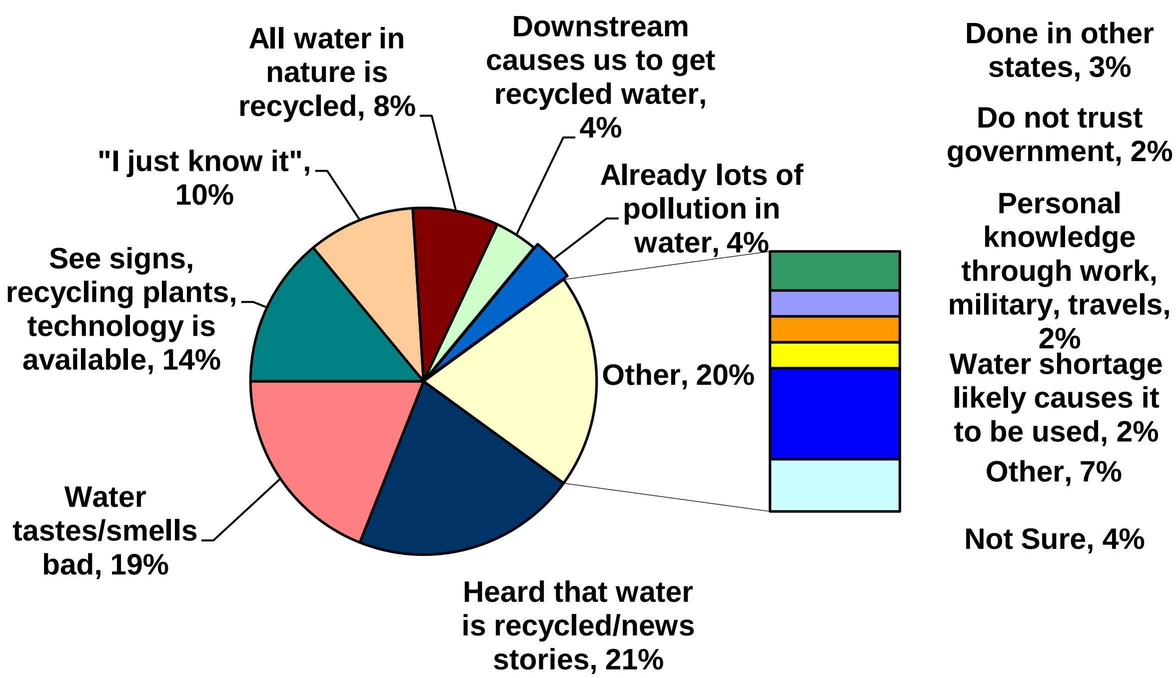
Chart 27
Believe that Drinking Water Already Contains Recycled Water?



The following group tends to think that drinking water already contains recycled water:

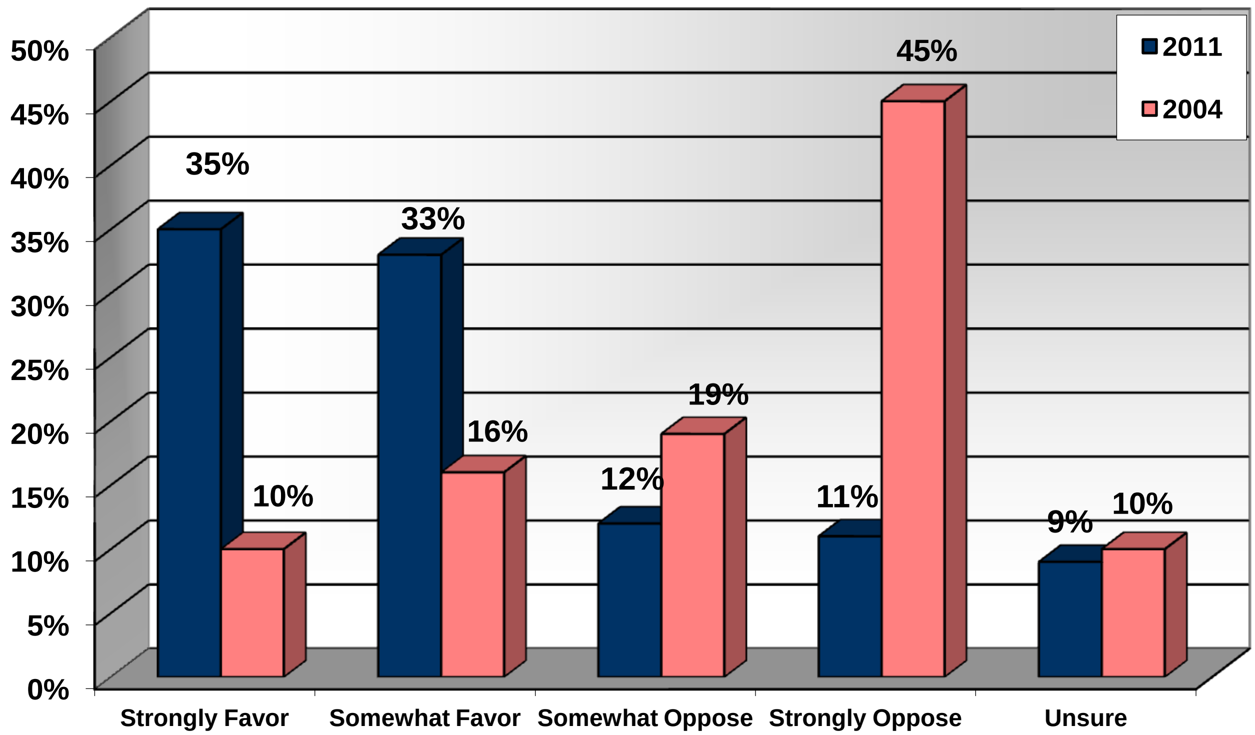
- Residents whose landlord pays the water bill (53 percent) versus residents who pay their own water bill (47 percent).

Chart 28
Reasons for Belief that Drinking Water Already Contains Recycled Water
(among 47 percent who think that drinking water contains recycyled water)



Respondents were asked whether or not they would favor using advanced treated recycled water as an addition to the supply of drinking water and that such advanced techniques include ultra-filtration, reverse osmosis, and advanced oxidation. (Explanations of these processes were provided upon request). **Chart 29** indicates that over two-thirds (68 percent) of the respondents either strongly favor (35 percent) or somewhat favor (33 percent) advanced treated recycled water as an addition to the supply of drinking water. It is important to note that this represents a dramatic increase in support for advanced treatment over the 2004 survey where only 26 percent of the respondents either strongly favored or somewhat favored advanced treated recycled water.

Chart 29
Opinion About Using Advanced Treated Recycled Water as an Addition to Drinking Water Supply
(scale 1 = Strongly Favor..5 = Strongly Oppose--mean = 1.99)



The following groups differ regarding their opinion about using advanced techniques to treat recycled water so that it can serve as an addition to the drinking water supply. The differences are expressed in terms of mean scores that are based on a scale, where 1 = strongly favor, 2 = somewhat favor, 3 = somewhat oppose, and 4 = strongly oppose.

- Younger residents are more in favor of advanced water recycling techniques than are older residents (35-44 years of age – mean of 1.76 versus 65-74 – mean of 2.20).
- Asians (mean of 1.83), Latinos (mean of 1.91), and Whites (mean of 1.98) are more inclined to favor advanced recycling techniques than are African-Americans (mean of 2.63).

Respondents, who did not already **strongly favor** the use of recycled water as an addition to the drinking water supply, were asked if they would accept recycled water for drinking purposes if it were subject to such advanced treatment and if they learned the following facts about recycled water (**Charts 30 - 32).**

The percentages reflect only those customers who formerly did not strongly favor the use of recycled water as an addition to the drinking supply but who changed their minds upon learning that:

- California drinking water standards are very strict and recycled drinking water would exceed those standards (54 percent); This represents a substantial increase from the results of the 2004 survey where an affirmative response of 38 percent was recorded (**Chart 30**).
- Recycled drinking water is used in other U.S. communities (50 percent); again, this represents a large (17 percent) increase over the 2004 survey result (**Chart 31).**
- Recycled drinking water could supply up to 10 percent of local supply (51 percent--only 30 percent were influenced by this statement in 2004--**Chart 32**).

Chart 30
Likelihood of Accepting Recycled Water to Supplement Drinking Water if Respondent Learned of Very Strict California Drinking Water Standards

(asked of 65 percent who were somewhat or less in favor of using recycled water for drinking)

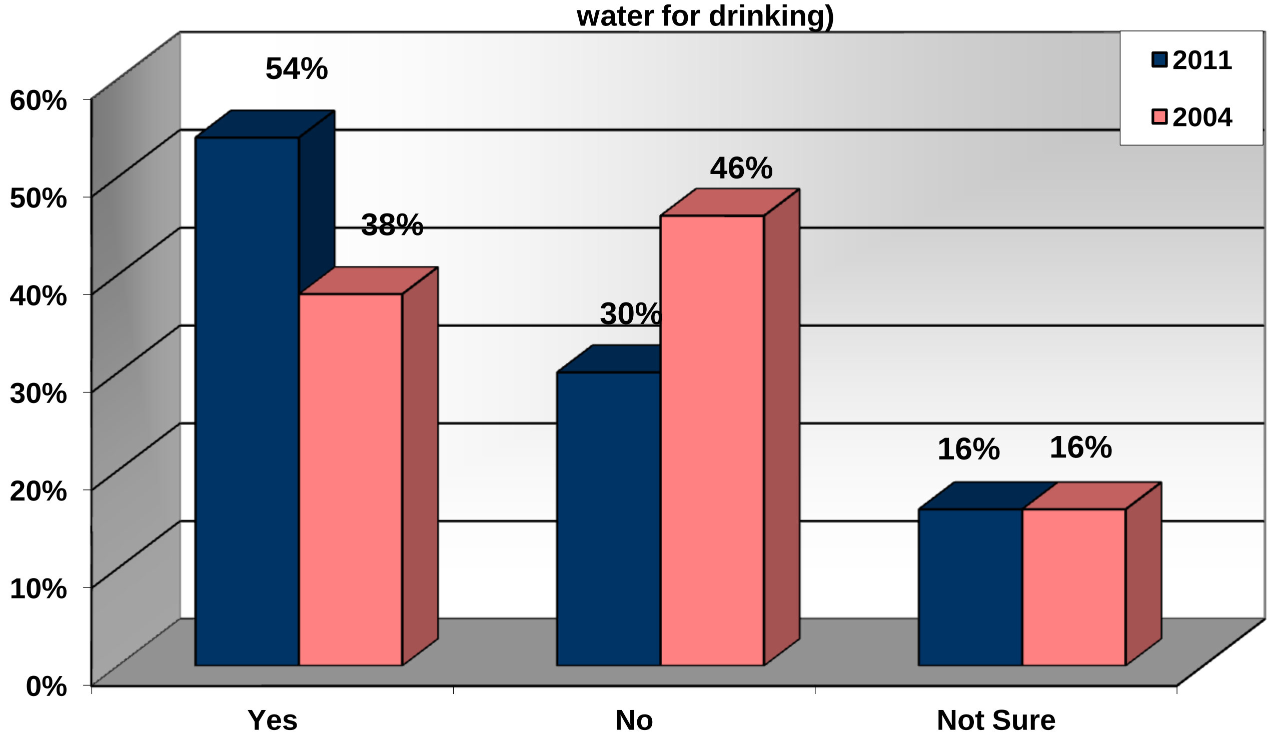
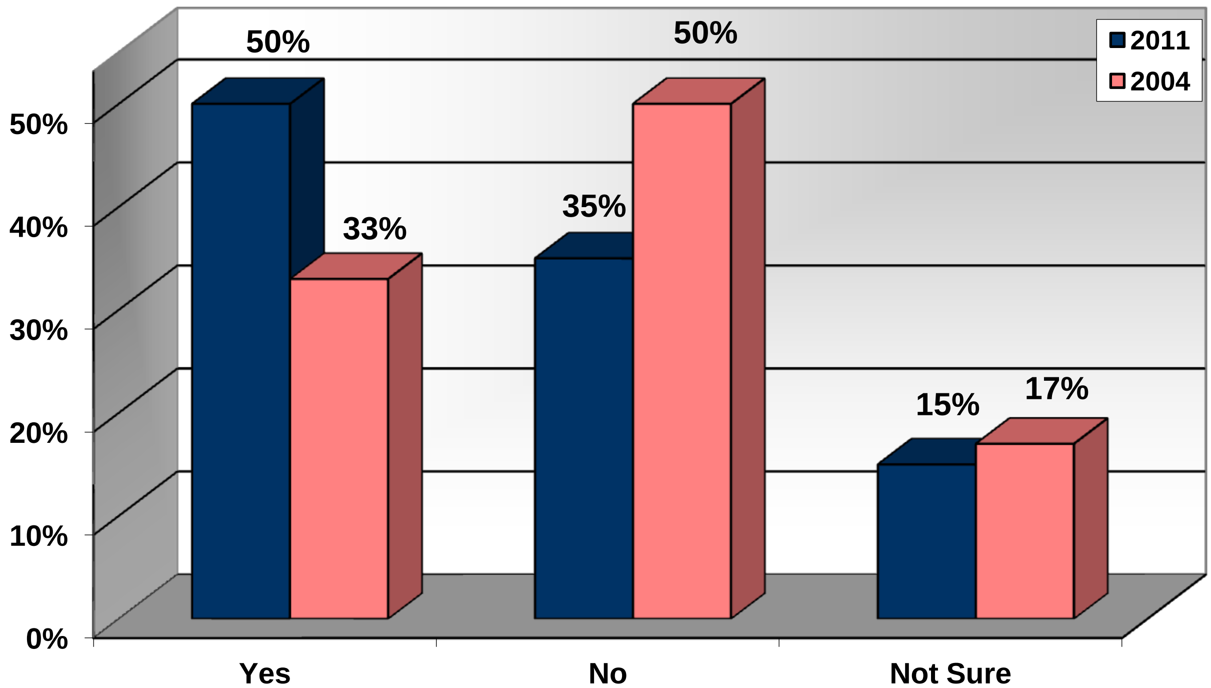


Chart 31
Likelihood of Accepting Recycled Water to Supplement Drinking Water if Respondent Learned that Other Communites Use Recycled Water as a Supplement
(asked of 65 percent who were somewhat or less in favor of using recycled



These findings show that over one-half of those who were originally not strongly in favor of using recycled water for drinking purposes would find it acceptable if it received advanced treatment and if certain other safety measures were assured. This is an increase of about 15 percent over the approximately 35 percent who changed their mind in 2004.

Table 2 shows that movement toward being more in favor of the use of recycled water for drinking water purposes differs, as would be expected, depending upon the degree to which the respondent was initially opposed or in favor of using recycled water for this purpose in the first place. Omitting all of those who were strongly in favor to begin with, it can be seen that the more in favor a respondent was initially, the easier it is for this information to sway his or her opinion. Among those who were previously somewhat in favor of recycled water being added to the drinking water supply, 67-72 percent are influenced by this information to be more in favor of this use of recycled water. It is striking that 34-45 percent of those who were formerly unsure are so moved by this added information to favor the use of recycled water for drinking purposes.

Chart 32
Likelihood of Accepting Recycled Water to Supplement Drinking Water if Respondent Learned that Recycled Water Could Supply up to 10 Percent of Local Drinking Water
(asked of 65 percent who were somewhat or less in favor of using recycled water for drinking)

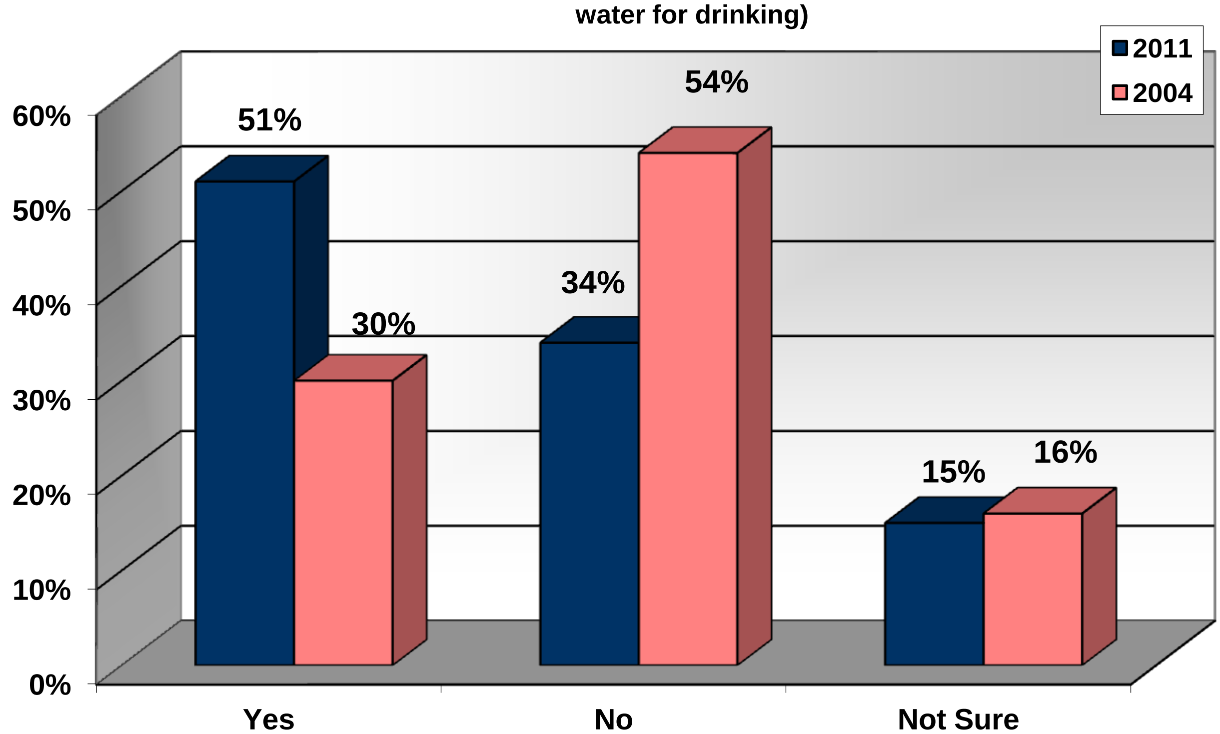
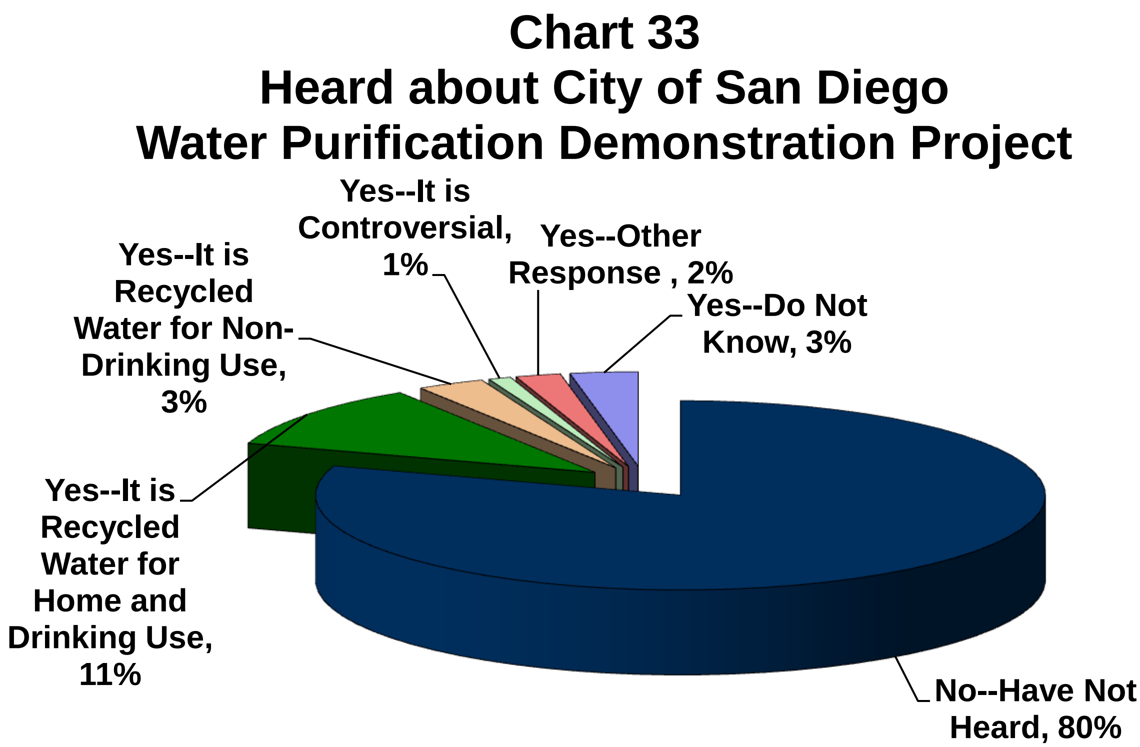


Table 2 Shift in Opinion Using Recycled Water (Percentages Represent Respondents Now Likely to Accept Recycled Water for Drinking Water Purposes)				
	Formerly Somewhat in Favor	Formerly Somewhat Opposed	Formerly Strongly Opposed	Don't Know/ Unsure
California drinking water standards are very strict and recycled drinking water would exceed those standards	72%	48%	16%	40%
Recycled drinking water is used in other U.S. communities	65%	50%	18%	34%
Recycled drinking water could supply up to 10 percent of local supply	67%	38%	21%	45%

The following subgroup is especially influenced by the knowledge that recycled water could supply as much as 10 percent of our local drinking water supplies:

- Residents whose landlord pays the water bill (59 percent) versus residents who pay their own water bill (48 percent).

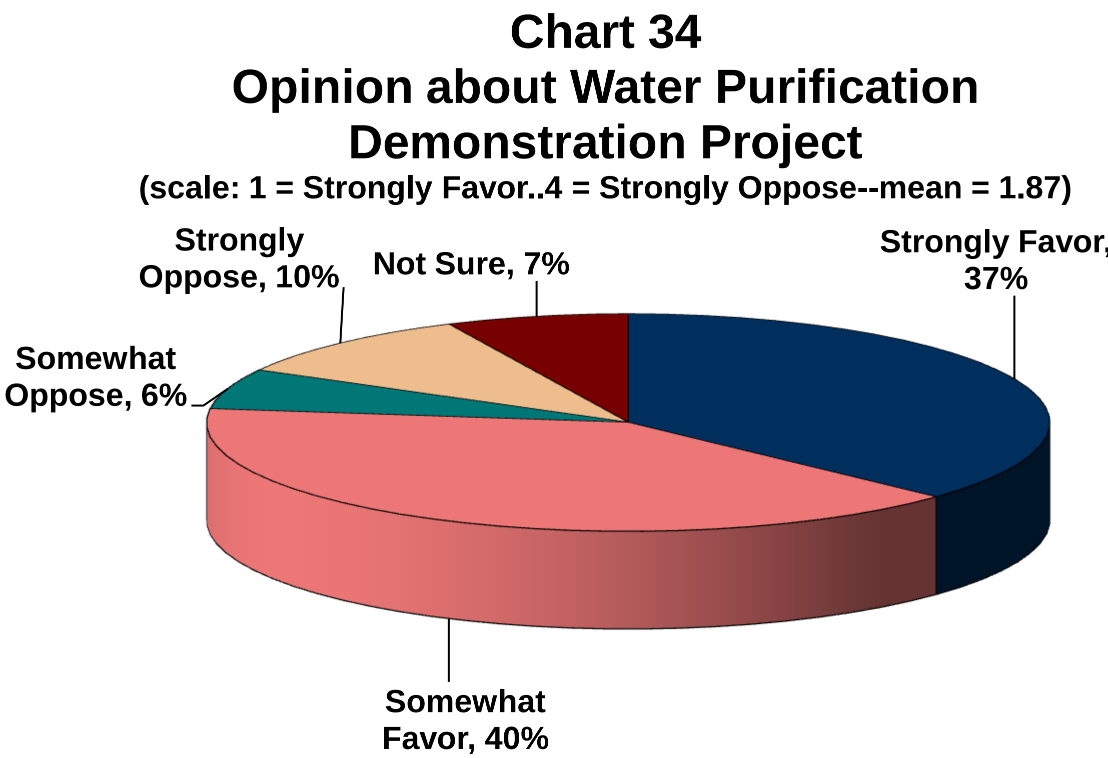
<u>City of San Diego Water Purification Demonstration Project</u>: Chart 33 shows that 80 percent of San Diego City residents have not heard of the City of San Diego Water Purification Demonstration Project. Among the 20 percent who have heard about this project, 11 percent know that it involves recycled water for drinking and household purposes and 3 percent believe that the project involves recycled water for a purpose other than household and drinking use.



Respondents were subsequently informed about the nature and purpose of the Water Purification Demonstration Project. When so informed, residents expressed substantial support for the Project. **Chart 34** shows that 77 percent of residents either strongly favor (37 percent) or somewhat favor (40 percent) the goals of the Project. This response represents strong approval for the use of recycled water for drinking purposes.

The following subgroups are less likely to have heard about the San Diego City Water Purification Demonstration Project:

- Residents whose landlord pays the water bill (88 percent) versus residents who pay their own water bill (78 percent).
- Renters (87 percent) versus homeowners (76 percent).

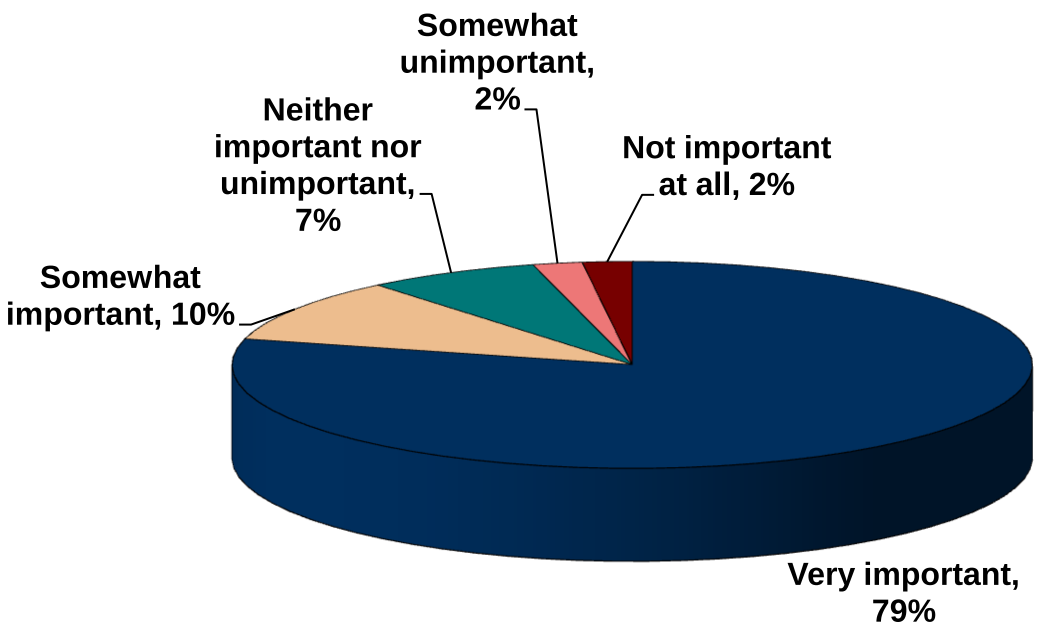


Attitudes about the Local Agricultural Industry and Water

SUMMARY: San Diego City residents have shown substantial support for their local agricultural community – over four-fifths feel that local farmers and agriculture are very important to the local economy. They further feel that reduced water rates for the agricultural industry should be maintained.

Chart 35 shows that nearly four-fifths (79 percent) of respondents feel that local farmers and agriculture are very important to the local economy. On a scale of 1 to 5, where 1 = very important and 5 = not important at all, the mean importance rating is 1.37. This represents a substantial indication of the region's support for its agricultural community.

Chart 35
Importance of Local Farmers and Agriculture to San Diego Economy
(scale: 1 = Very important..5 = Not at all important--mean = 1.37)



This positive attitude toward farmers and agriculture is further corroborated in **Chart 36** which shows that 84 percent of respondents feel that reduced water prices for farmers and agriculture should be maintained.

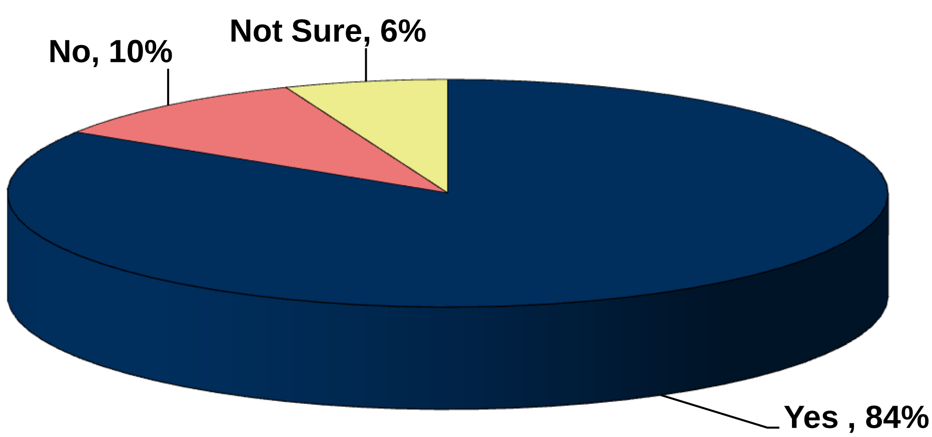
The following groups are more likely to think that reduced water prices for farmers should be maintained:

- Those who prefer to communicate in English are more likely to favor the maintenance of reduced water prices for farmers than are those who prefer Spanish (English speaking – 87 percent; Spanish speaking – 72 percent).
- Residents of single family homes and condominiums (87 percent each) versus residents of apartments (76 percent) and mobile homes (78 percent).
- Residents who own their homes (88 percent) versus those who rent their homes (81 percent).

The following groups differ regarding how important they think farmers and agriculture are to the San Diego economy. The differences are expressed in terms of mean scores that are based on a scale where 1 = very important to 5 = not important at all.

- Latinos (mean of 1.18) regard farmers and agriculture as being more important to the San Diego economy than do Whites (mean of 1.47) and Asians (mean of 1.57).
- Residents with one year of graduate work or more (mean of 1.20) attach more importance to farmers and agriculture than do those with a high school education or less (mean of 1.61).

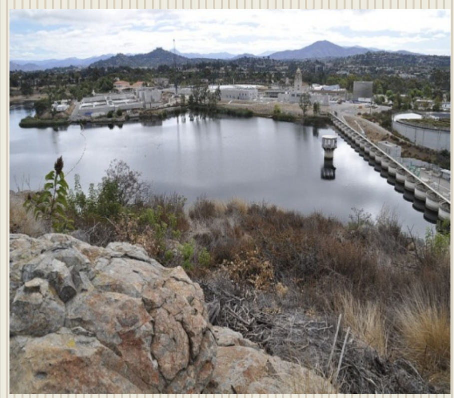
Chart 36
Maintain Reduced Water Rates for Farmers and Agriculture



2012 Public Opinion Poll Report

The City sub-sample of the 2012 Public Opinion Poll Report can be found on the following pages. The appendix is not included in this document, but it can be found at http://www.sandiego.gov/water/waterreuse/demo/links.shtml.

San Diego County Water Authority
2012 Public Opinion Poll Report
City of San Diego Sample Subset



CITY OF SAN DIEGO PUBLIC UTILITIES

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August 16, 2012

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Executive Summary

The San Diego County Water Authority has conducted a public opinion survey within its service area in San Diego County in order to measure the region's opinion regarding various water related issues. Rea & Parker Research was selected to be the lead consultant for this 2012 Public Opinion Poll. Rea & Parker Research also conducted surveys for the Water Authority in 2000, 2003, 2004, 2005, 2006, 2008, and 2009, and 2011. A portion of this public opinion poll, as in 2004 and 2011, was specifically geared to residents within the City of San Diego, in particular concerning the City of San Diego Water Purification Demonstration Project. This 2012 study has established the following as its primary objectives:

- Identify the level of public concern about cost of water and rising rates
- Assess the tolerance for additional rate increases to support desalination
- Identify major drivers for recent reductions in water use
- Determine factors that might increase the likelihood for regional water use to "rebound"
- Recycled water and the City of San Diego Water Purification Demonstration Project

This continuity of survey administration greatly facilitates the tracking of responses from year-to-year, including the consistency of wording and interviewing that adds to the statistical reliability of such comparisons.

The purpose of this report is to present the results of the San Diego County Water Authority 2012 Public Opinion Poll specifically for residents located within the City of San Diego.

The San Diego City portion of the survey was conducted by a random telephone sample of 400 respondents, which equates to a margin of error +/-4.9 percent @ 95 percent confidence. The sample included 74 residents who were only cell phone users (do not use land-line telephone). All participants were at least 18 years old and had lived in San Diego County at least one year.

Respondents are predominantly White (61 percent), with 21 percent Hispanic/Latino, 11 percent African-American/Black, 5 percent Asian/Pacific Islander, and 2 percent American Indian/Native American and Mixed Ethnicities. Residents earn a median household income of $57,700 per year (24 percent earning $100,000 or more and 12 percent earning under $25,000). They have a median age of 54 years and have lived in the County for a median of 27 years.

Among respondents, 61 percent possess a Bachelor's Degree or more, with 12 percent having a High School education or less. The zip codes most represented in the survey are as follows – each with 5 percent-to -6 percent of the respondents: 92104, 92105, 92110, 92115, 92116, 92117, 92128, and 92154. Home ownership percentage is 66 percent, with a mean of 2.90 persons per household.

Survey Findings

The 2012 Public Opinion Poll focused on six essential topics. It sought to identify and analyze, in particular,

- Identify the level of public concern about cost of water and rising rates
- Assess the confidence and trust in the regional water supply

- Evaluate progress made toward water conservation
- Assess the importance of desalination to the reliability of the water supply
- Evaluate progress made toward Strategic Plan objectives
- Water recycling

As such, this report has been divided into seven sections, as follows:

- Opinions about Local Issues
- Relative Value of Water and Other Utilities
- Water Reliability and Plans to Diversify Water Sources
- Seawater Desalination
- Attitudes about Water Conservation
- Opinions about the Use of Recycled Water (including attitudes about the City of San Diego Water Purification Demonstration Project)
- Water Rates

Opinions about Local Issues

- Residents identified the most important issues in San Diego County as the Economy and Jobs (36 percent), Financial Problems in Government including high taxes (19 percent), the Quality and Cost of Education (10 percent) followed by Water Supply Quality and Cost (9 percent) and Infrastructure (5 percent). The high level of concern regarding the condition of the economy was also found in the 2011 survey. The top two issues are not surprising since, during the past few years, there has been considerable, sustained attention devoted to the fiscal stress of local and state governments as well as the problems in the economy as a whole.
- One third of respondents (33 percent) are aware that the San Diego County Water Authority has filed a lawsuit alleging that the Metropolitan Water District is overcharging San Diego County ratepayers for the cost of transporting imported water to San Diego.

Relative Value of Water and Other Utilities

- Water is seen as a good value for the amount of money paid compared to other utilities; however, water has fallen relative to gas and electric as a good value since 2011.
- When asked to indicate the best value among utilities, 37 percent indicate that gas and electric is the best value and 16 percent rank water as such.
- Among all respondents, when first, second and third choices are weighted, 29 percent view gas and electric as the best value among utilities, with water second at 17 percent.

Water Reliability and Plans to Diversify Water Sources

Water Reliability

- Among residents of the City of San Diego, nearly four-fifths find that the current supply of water is either very reliable (37 percent) or somewhat reliable (42 percent) and can be consistently relied upon to meet the region's needs. This positive attitude toward water supply reliability is highly consistent with the results of the 2011 survey. Both the 2011 and 2012 survey years represent a clear enhancement in the perception of water supply reliability from the results of the 2004 survey.
- However, respondents are expressing a decreasing level of confidence in how they perceive the trend in the water supply (improving, worsening, or staying the same). Just over one-tenth (13 percent) of residents feel that water supply reliability is improving – a decrease of 11 percent from the 24 percent level recorded in 2011, and 27 percent see the supply as worsening—a 5 percent increase over 2011.
- Nearly three-fifths of respondents (59 percent) have trust in the ability of local water agencies to provide clean, safe, water for their customers.
- Almost one-third (32 percent) of respondents have either a great deal of trust (7 percent) or a good amount of trust (25 percent) in the ability of local water agencies to obtain water at reasonable prices.
- Nearly one-half of the respondents (49 percent) are aware of efforts by the San Diego County Water Authority to make the water supply more reliable. Respondents identified the following efforts as particularly noteworthy in this regard: water transfers and water importation from the Colorado River and the Imperial Valley (19 percent), improvement of the infrastructure (17 percent), and seawater/ocean water desalination (11 percent).
- The most critical things that can be done to ensure a safe and reliable water supply for San Diego County residents and businesses are to improve the quality of the water (19 percent), pursue seawater desalination (13 percent) and improve infrastructure (10 percent).

Diversification Plan

- Over one third of respondents indicate that the most important part of the Water Authority's Diversification Plan is seawater desalination (34 percent) followed by recycled water (21 percent), and the development of local reservoirs (18 percent). Seawater desalination continues to be regarded as the most important component of the Diversification Plan in the view of the respondents. Recycling has declined since 2011 in its importance as a component of the Diversification Plan. Local reservoirs have gained substantial ground.
- Three-fifths (60 percent) of residents are in support of the San Diego County Water Authority's Diversification Plan with ratings of strongly agree (40 percent) and agree (20 percent). This represents a decline in support of the Diversification

Plan from the results of the 2011 survey where 80 percent either strongly agreed or agreed that the Diversification Plan would improve water supply reliability.

Seawater Desalination

- Over four-fifths (82 percent) of respondents feel that seawater desalination is important to the reliability of the water supply (53 percent -- very important and 29 percent -- somewhat important).
- Respondents are most favorably influenced toward desalination by the following message: "Desalinated water is a drought-proof local supply of water," which is followed very closely by "Desalinated water reduces the San Diego region's dependence on supplies from the Metropolitan Water District" and by "Desalination will reduce the region's demand for supplies of imported water from Northern California and the Colorado River." The least influential message is as follows: "Desalinated water is competitive with the cost of developing other new sources of water supplies."
- Nearly two-thirds (66 percent) expressed a willingness to pay something more per month to add seawater desalination to the water supply. Among this 66 percent, 57 percent indicated that they would pay $5 or more additionally per month.
- Among those who indicated a precise amount, the average (mean) additional amount they are willing to pay is $13 per month.

Attitudes about Water Conservation

Water Use in Past Year

- Water conservation is a significant component in San Diego County's water supply plans. Over one-fourth of respondents (26 percent) indicated that their household water usage has decreased over the past year. This represents a decline of 2 percent among those who indicated that they decreased their water usage in 2011 (28 percent). This decline is offset, however, by a 4 percent decline in those indicating that their usage had increased.
- Among those who indicated that their household water usage has declined, nearly one-half (48 percent) feel that reducing water usage is the "right thing to do." In 2011, a somewhat smaller (but still substantial) percentage was motivated to reduce water usage because it is the "right thing to do" (31 percent).
- Over one-fourth (27 percent) were motivated to reduce water usage because they are watching their budget and this represents a slight decline since 2011 when 35 percent were so motivated by budgetary concerns to reduce their water usage.
- The vast majority—almost 90 percent—indicated that their reduced water usage is permanent and this is consistent with the 2011 finding.

Water Use in the Future

- It is most encouraging that when water agencies no longer take an active role in restricting water use, respondents who have reduced their water usage during the past year indicate that they are not likely to increase their water use to a great extent (22 percent would increase). When the economy rebounds, only 18 percent anticipate increasing their water usage.
- On the other hand, a less cool and less wet year would lead to nearly three-fifths (57 percent) of those who have reduced their water use during the past year returning to higher usage. These views about higher water in the future parallel the views of the 2011 survey respondents.

Water Conservation as a Civic Responsibility

- Virtually all of the respondents (95 percent) think that it is their civic responsibility to use water as efficiently as possible.
- In the current survey period as well as in 2011, respondents regard water conservation as a greater civic responsibility than serving on a jury. For voting in public elections and not littering/not polluting, water conservation is seen as less of a civic responsibility. Water conservation and recycling used materials are closer to equality as civic responsibilities.

Opinions about Recycled Water

- Over 7 in 10 respondents (71 percent) believe that it is possible to further treat recycled water previously used for irrigation to make the water pure and safe for drinking. This represents a slight increase over the 2011 survey finding where two-thirds (67 percent) felt that it is possible to further treat recycled water for drinking purposes.
- Nearly three fifths of the respondents (56 percent) believe that drinking water already contains recycled water. This reflects a clear upward movement in the percentage of those who hold this belief – 47 percent in 2011.
- Three primary reasons are provided to explain why respondents feel that drinking water already contains recycled water. Respondents feel they hear that water is recycled from news stories (19 percent), they “just know it” (includes hunches and common sense) (17 percent), and water tastes and smells bad (16 percent). In 2011, hearing about recycled water from news stories was also the most dominant reason (21 percent). The reason “just know it” increased in importance by 7 percent from the 10 percent reported in 2011.
- Nearly three-fourths (73 percent) of the respondents either strongly favor (36 percent) or somewhat favor (37 percent) advanced treated recycled water as an addition to the supply of drinking water. This represents an increase in support for advanced treatment over the 2011 survey where 68 percent of the respondents either strongly favored or somewhat favored advanced treated recycled water. Interest in using such advanced techniques has increased substantially since 2004.

- Among the 20 percent who have heard about the Water Purification Demonstration Project, 6 percent know that it involves recycled water for drinking and household purposes – a decline of 5 percent from the 11 percent who correctly identified the purpose of the project in 2011. When respondents were informed about the Project, they expressed substantial support for the Project – over three-fourths either strongly favoring the project or somewhat favoring it. This level of support parallels the support indicated in the 2011 survey.

Water Rates

- Over two-fifths (45 percent) of respondents feel that the cost of water is too expensive and another 54 percent feel that the cost is fair and reasonable. This represents a decline from the 2011 survey period among those who feel the cost of water is too expensive -- in 2011, 52 percent indicated water was too expensive. This result points to a trend toward an enhanced understanding of and tolerance for the cost of water.
- The dominant causes that residents indicate for increases in water rates are more water being consumed by customers (20 percent) and less rain in San Diego (18 percent)—both of which are not correct.
- Three-fifths of respondents (60 percent) feel that increases in water rates are necessary to maintain reliability of the water supply while well over one-third of the respondents (36 percent) feel that increased water rates are not necessary and should be stopped. This reaffirms the shift from the 2011 survey results toward an understanding of and a tolerance for water rate increases. In the 2011 survey, there was a near equal split in opinion about the necessity of water rate increases to pay for projects designed to improve water supply reliability.
- Despite their seeming understanding of increasing water rates, almost two-thirds (65 percent) indicate that they very concerned (41 percent) or somewhat concerned (24 percent) about the prospect of continued increases in water rates. This level of concern is consistent with the results of the 2011 survey where 61 percent were either very concerned or somewhat concerned about continued increases in water rates.

Introduction and Methodology

The San Diego County Water Authority has, over the years, conducted a public opinion survey within its service area in San Diego County in order to measure public opinion regarding water issues. Rea & Parker Research was selected to be the lead consultant for this 2012 Public Opinion Poll. Rea & Parker Research, in association with Flagship Research, also conducted public opinion polls for the Water Authority in 2000, 2003, 2004, 2005, 2006, 2009, and 2011 and two water conservation surveys in 2008 to test the effectiveness of conservation messages. This continuity of survey administration greatly facilitates the tracking of responses from year-to-year, including the consistency of wording and interviewing that adds to the statistical reliability of such comparisons.

The City of San Diego requested that the sample include about 400 respondents specifically residing within the boundaries of the City. It was also requested by the City of San Diego that specific questions pertaining only to City residents be included in the survey. These same questions were specifically directed at issues pertaining to the City of San Diego Water Purification Demonstration Project. This same process of additional questions for the City of San Diego sub-sample was followed in 2004 and in 2011. Accordingly, Rea & Parker Research has compared 2004 and 2011 survey data with the results of the current survey where questions were the same or nearly the same.

The purpose of this report is to present the results of the San Diego County Water Authority 2012 Public Opinion Poll for respondents located within the City of San Diego.

The primary objectives of the 2012 research are as follows:

- Identify the level of public concern about cost of water and rising rates
- Assess the confidence and trust in the regional water supply
- Evaluate progress made toward water conservation
- Assess the importance of desalination to the reliability of the water supply
- Evaluate progress made toward Strategic Plan objectives
- Identify knowledge and opinions about the Water Purification Demonstration Project (City sub-sample only)

As such, this report has been divided into seven essential information components as follows:

- Opinions about Local Issues
- Relative Value of Water and Other Utilities
- Water Reliability and Plans to Diversify Water Sources
- Seawater Desalination

- Attitudes about Water Conservation
- Opinions about the Use of Recycled Water (including attitudes about the City of San Diego Water Purification Demonstration Project)
- Water Rates

Sample

The 2012 Public Opinion Poll was conducted between July 9 and July 25, 2012, including a random telephone sample of 400 respondents located within the City of San Diego. The random sample was selected by random digit dialing from the zip codes contained within the City of San Diego. This sample yields a margin of error of +/- 4.9 percent @ 95 percent confidence. The sample includes 74 residents who are only cell phone users (do not use land-line telephone). All participants were at least 18 years old and had lived in San Diego County at least one year. It is important to note that the sample of 400 is a subset of the larger sample of 816 representing the entire San Diego Water Authority service area.

The margin of error for this survey represents the widest interval that occurs when the survey question represents an approximate 50%-50% proportion of the sample. When it is not 50 percent-50 percent, the interval is somewhat smaller. For example, in the survey findings that follow, 49 percent of respondent households indicate that they are aware of efforts by the San Diego County Water Authority to make the supply of water even more reliable. This means that there is a 95 percent chance that the true proportion of the total population of the Water Authority's service area who have this awareness is between 44.1 percent and 53.9 percent (49 percent +/- 4.9 percent).

Survey Instrument

The survey instrument contained 41 questions, including 69 individual survey items (variables). The survey instrument was administered in both English and Spanish. A copy of the survey is attached in the Appendix. A total of 18 respondents (4.5 percent) elected to respond in Spanish

Respondent Characteristics

Table 1 presents certain demographic characteristics of the survey respondents and also provides the 2011 characteristics for comparative purposes. In 2012, respondents are predominantly White (61 percent), with 21 percent Hispanic/Latino, 11 percent African-American/Black, 5 percent Asian/Pacific Islander, and 2 percent American Indian/Native American and Mixed Ethnicities. Residents earn a median household income of $57,700 per year (24 percent earning $100,000 or more and 12 percent earning under $25,000). They have a median age of 54 years and have lived in the County for a median of 27 years. Among respondents, 61 percent possess a Bachelor's Degree or more, with 12 percent having a High School education or less. The zip codes most represented in the survey are as follows – each with 5.0-6.0 percent of the respondents: 92104, 92105, 92110, 92115, 92116, 92117, 92128, and 92154.

Table 1
City of San Diego Survey Respondent Demographics

Demographic Characteristic	2012	2011
<u>Gender</u>		
Male	57%	45%
Female	43%	55%
Median Age (Years)	54	48
Median Number of Years Lived in Community	27	22
<u>Highest Grade/Level of School Completed</u>		
High School or Less	12%	27%
Some College	27%	28%
Bachelor's Degree	36%	28%
Some Graduate School	25%	17%
<u>Ethnicity</u>		
White	61%	53%
Latino/Hispanic	21%	28%
African-American/Black	11%	8%
Asian/Pacific Islander	5%	7%
Native American/Mixed	2%	4%
Median Household Income	$57,700	$52,200
Home Ownership Percentage	66%	62%
<u>Type of Housing</u>		
Single Family Detached	69%	60%
Condominium	15%	18%
Apartment	15%	20%
Mobile Home	1%	2%
Mean Number of Persons per Household	2.90	3.02
Pay Own Water Bill	68%	72%

The home ownership percentage is 66 percent, with a mean of 2.90 persons per household. Among White and Asian respondents, 74 percent are homeowners. This is consistent with the 2011 homeownership rate for Whites and Asians of 72 percent. Black/African-American homeowners have increased from 45 percent in 2011 to 54 percent in the current survey and the homeownership rate for Hispanics/Latinos has also increased to 54 percent from their 2011 homeownership rate of 40 percent.

Other differences between the current 2012 survey respondents and the respondents from previous years are as follows:

- The 2012 survey respondents have completed more higher education than respondents in 2011.
- The 2012 respondents are more represented by Whites and less represented by Hispanics/Latinos than the respondents in the 2011 survey.
- The percentage of homeowners (70 percent) is higher than in 2011, as is the percentage of single-family residence dwellers.
- Respondents in 2012 are somewhat older in 2012 than they were in 2011 (2012 median of 54 years of age versus 2011 median of 48 years of age) and have resided in County for a longer term (27 years in 2012 versus 22 years in 2011).
- A smaller percentage of respondents pay their own water bills in 2012 than in 2011.

Survey Findings

Each section of the report will begin with a very brief abstract, or summary of highlights within the ensuing section, in order to orient the reader to what is to follow. Charts have been prepared for each section that depict the survey results for the 2012 survey and for the 2011 and 2004 surveys where questions are repeated and results can be directly compared. Each section will include a discussion of the survey periods. Detailed statistical frequency distributions and a full listing of verbatim open-ended responses are contained in the Appendix along with the survey instrument for reference.

Lastly, subgroup analyses for different age groups, various levels of education, gender, home ownership/rental status, household size, residential tenure in the community, different income categories, cell phone only/land line users, and water bill payers/non-payers and ethnicity of residents of the City will be presented in a succinct, bulleted format when statistical significance and relevance warrants such treatment.

Opinions about Local Issues

SUMMARY: Residents identified the most important issues is San Diego County as the Economy and Jobs, Financial Problems in Government including high taxes, and the Quality and Cost of Education. The high level of concern regarding the condition of the economy was also found in the 2011 survey. The first two ranked issues are not surprising since, during the past few years, there has been considerable, sustained attention devoted to the fiscal stress of local and state governments

as well as the economy as a whole. The concern for the quality and cost of education as well as the quality and supply of water are similar in 2012 and 2011.

One-third of respondents are aware that the San Diego County Water Authority has filed a lawsuit alleging that the Metropolitan Water District is overcharging San Diego County ratepayers for the cost of transporting water to San Diego.

Chart 1 shows that the most important current issues identified by residents of the City of San Diego are the Economy and Jobs (36 percent), Financial/Political Problems in Government including high taxes (19 percent), and the Quality and Cost of Education (10 percent), followed by the Quality and Cost of Water (9 percent) and Infrastructure (5 percent). The high level of concern regarding the condition of the economy, found in the 2011 survey, is repeated in the current survey. Respondents report that governmental financial problems also remain at the high level of concern found in the 2011 survey results. In fact, this concern for the general economy and fiscal problems in government has increased to some extent in the current survey. This is not surprising since, during the past few years, there has been considerable attention devoted to the fiscal stress of local and state governments as well as problems in the economy as a whole. The concern for the quality and cost of education as well as the cost, quality and supply of water are similar in 2012 and 2011.

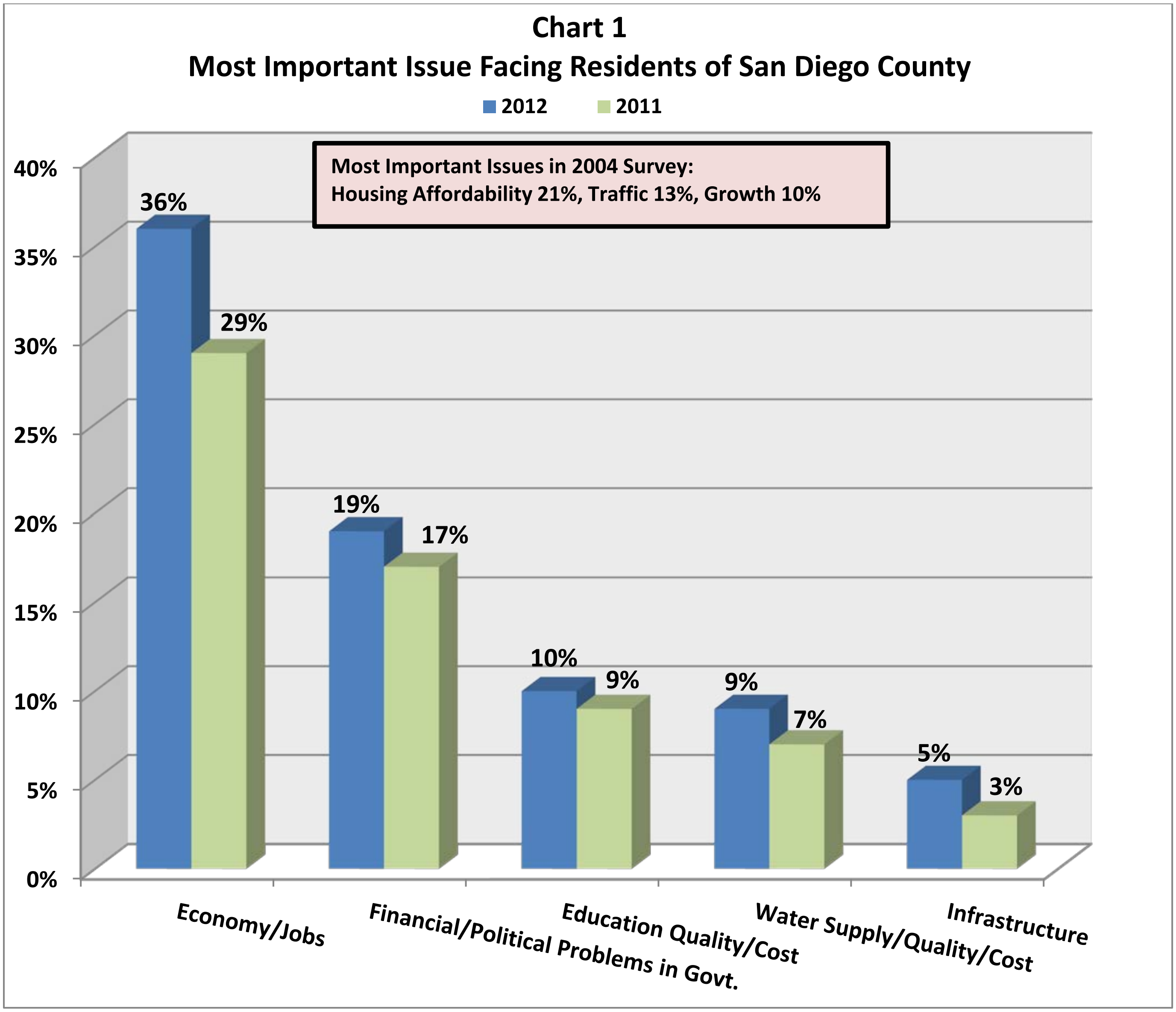
In 2004, respondents indicated that the most important issues were housing affordability (21 percent) traffic (13 percent), and growth and development (10 percent). Other responses that did not receive enough mention to merit an individual listing in the chart can be viewed in the Appendix, where the full listing of responses is displayed.

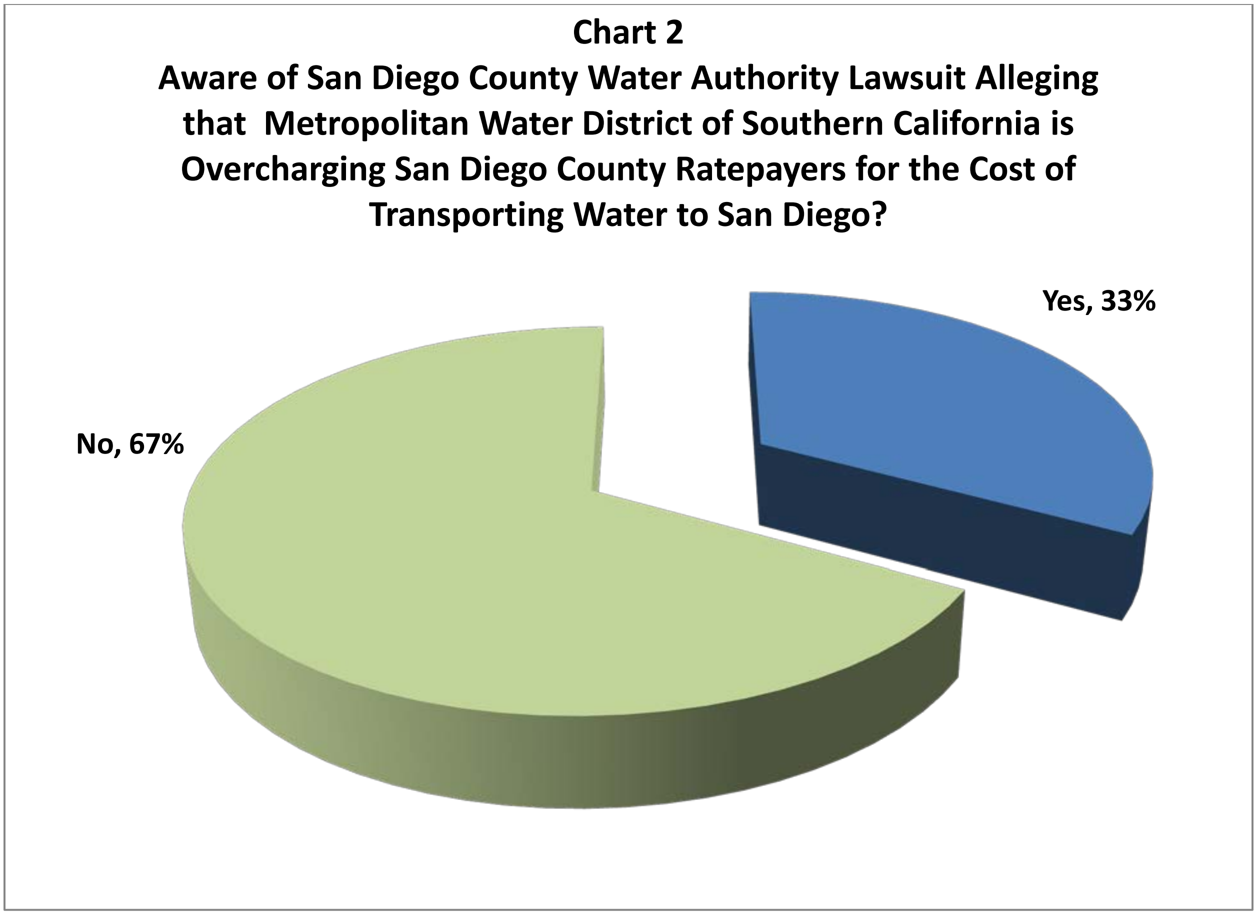
Respondents were asked whether they are aware that the San Diego County Water Authority has filed a lawsuit against the Metropolitan Water District of Southern California for overcharging San Diego County taxpayers for the cost of transporting imported water to San Diego. **Chart 2** shows one-third of City respondents (33 percent) are aware of this lawsuit.

The following groups are more likely to be aware that the San Diego County Water Authority has filed a lawsuit alleging that the Metropolitan Water District is overcharging San Diego County ratepayers for the cost of transporting imported water:

- Males (39 percent) versus females (26 percent).
- Residents who pay their own water bill (37 percent) as opposed to those whose water bill is paid by someone else such as a landlord (26 percent).

- Homeowners (39 percent) versus renters (24 percent).
- Asians (47 percent) and Whites (37 percent) versus Blacks/African-Americans (27 percent) and Hispanics/Latinos (21 percent).
- Residents who are 65 years of age and over (54 percent) versus residents who are 44 years of age and under (18 percent).
- Longer term residents of the County (45 or more years – 49 percent versus 20 years or less – 23 percent).





Relative Value of Water and Other Utilities

Summary: Water is seen as a relatively good value for the amount of money paid in comparison to other utilities, such as gas and electric service and phone service. However, water has fallen relative to gas and electric as a good value since 2011. When asked to indicate the best value among utilities, 37 percent indicate that gas and electric is the best value and 16 percent rank water as such. Among all respondents, when the data are weighted for the utilities of first choice, second choice, and third choice, 29 percent view gas and electric service as the best value, followed by water at 17 percent.

Residents were asked their opinion regarding the utility that provides them with the best value for the money paid. **Chart 3** shows the survey results for all City of San Diego respondents. Water is seen as a relatively good value for the amount of money paid in comparison to other utilities, including gas and electric service, phone service, and Internet access, among others. When asked to indicate the best value among utilities, 37 percent indicate that gas and electric is the best value and 16 percent rank water as such. Among all respondents, when the data are weighted for the utilities of first choice, second choice, and third choice, 29 percent view gas and electric service as the best value, followed by water at 17 percent. In 2011, respondents also considered gas and electric as the best relative value (30 percent); however, it is noteworthy that the relative value of water fell by 4 percent (from 21 percent in 2011 to 17 percent in 2012).

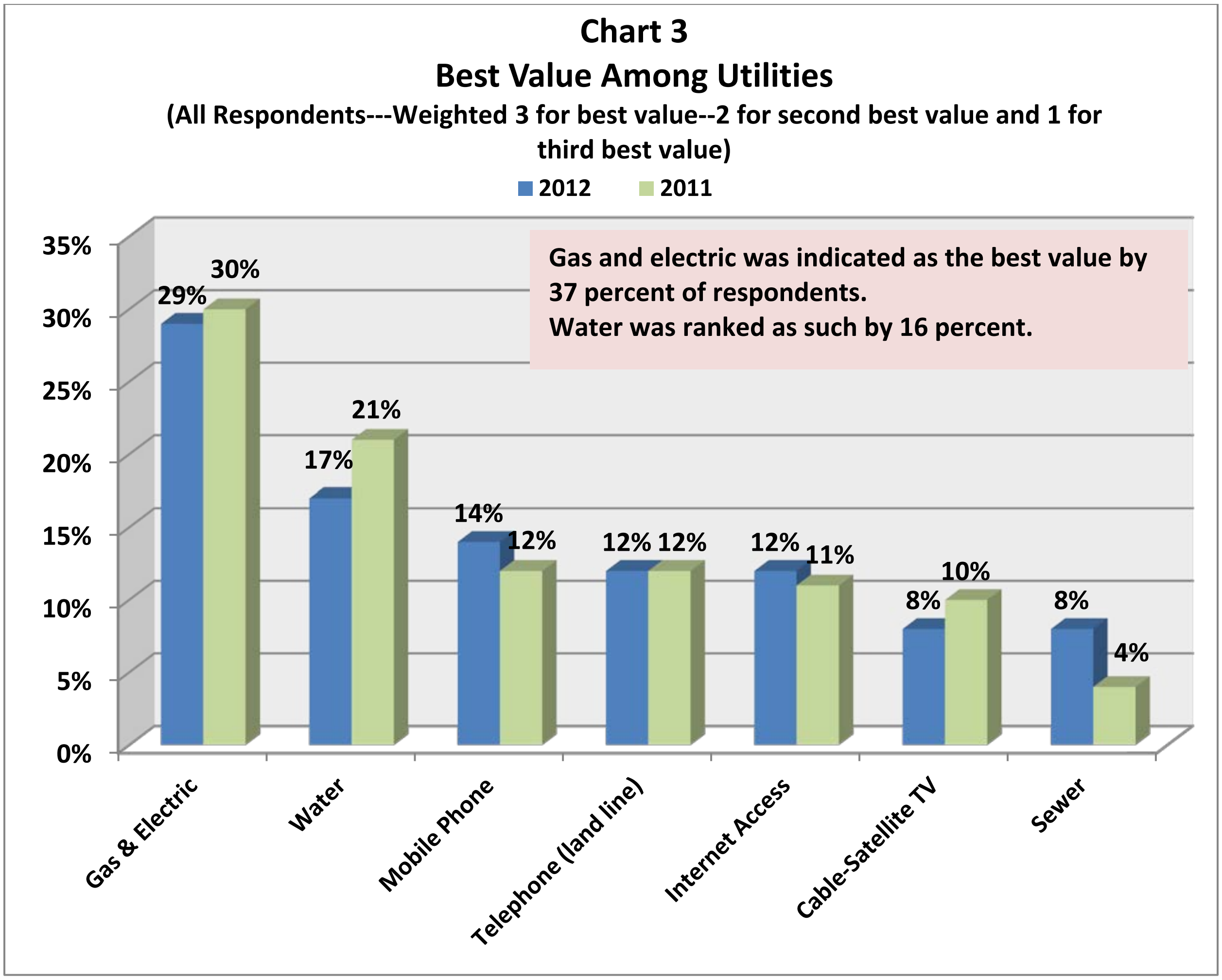
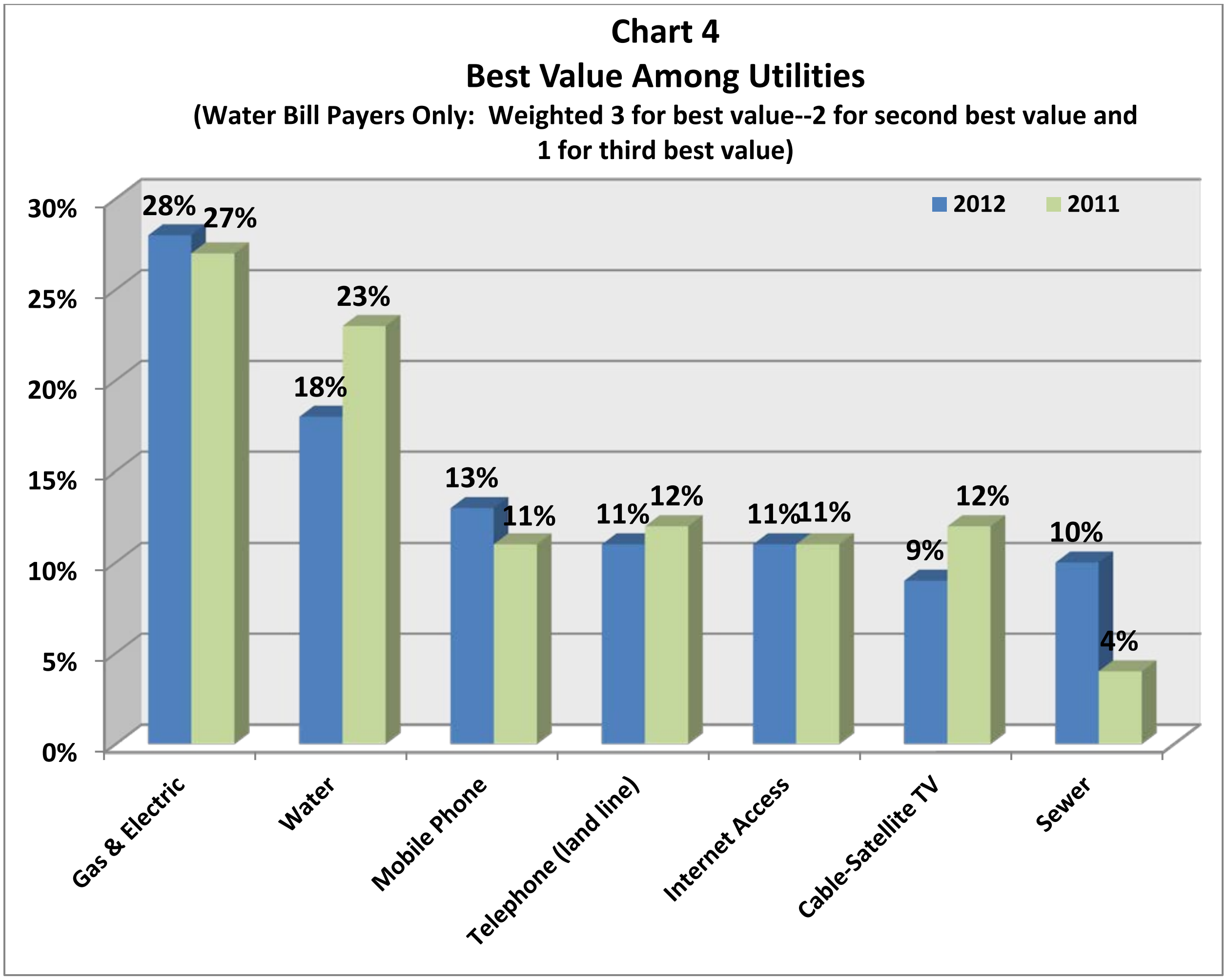


Chart 4 shows how certain respondents view the relative value of utilities by including only those who pay their own water bill. This exclusion attempts to control for those who do not pay their own water bills (thereby causing their assessment of value to be less relevant than those who do pay their own bills). As a result of this screen, the relative value of gas and electric decreases by 1 percent (from 29 percent to 28 percent) and the relative value of water increases by 1 percent (from 17 percent to 18 percent). It should be noted that trash collection is not included in the analysis because residents of the City of San Diego do not pay directly for trash collection.

- Those who pay their own water bill (18 percent) tend to choose water as the best value among various utilities more so than do those whose water bills are paid by their landlord or homeowners' association, for example (12 percent).



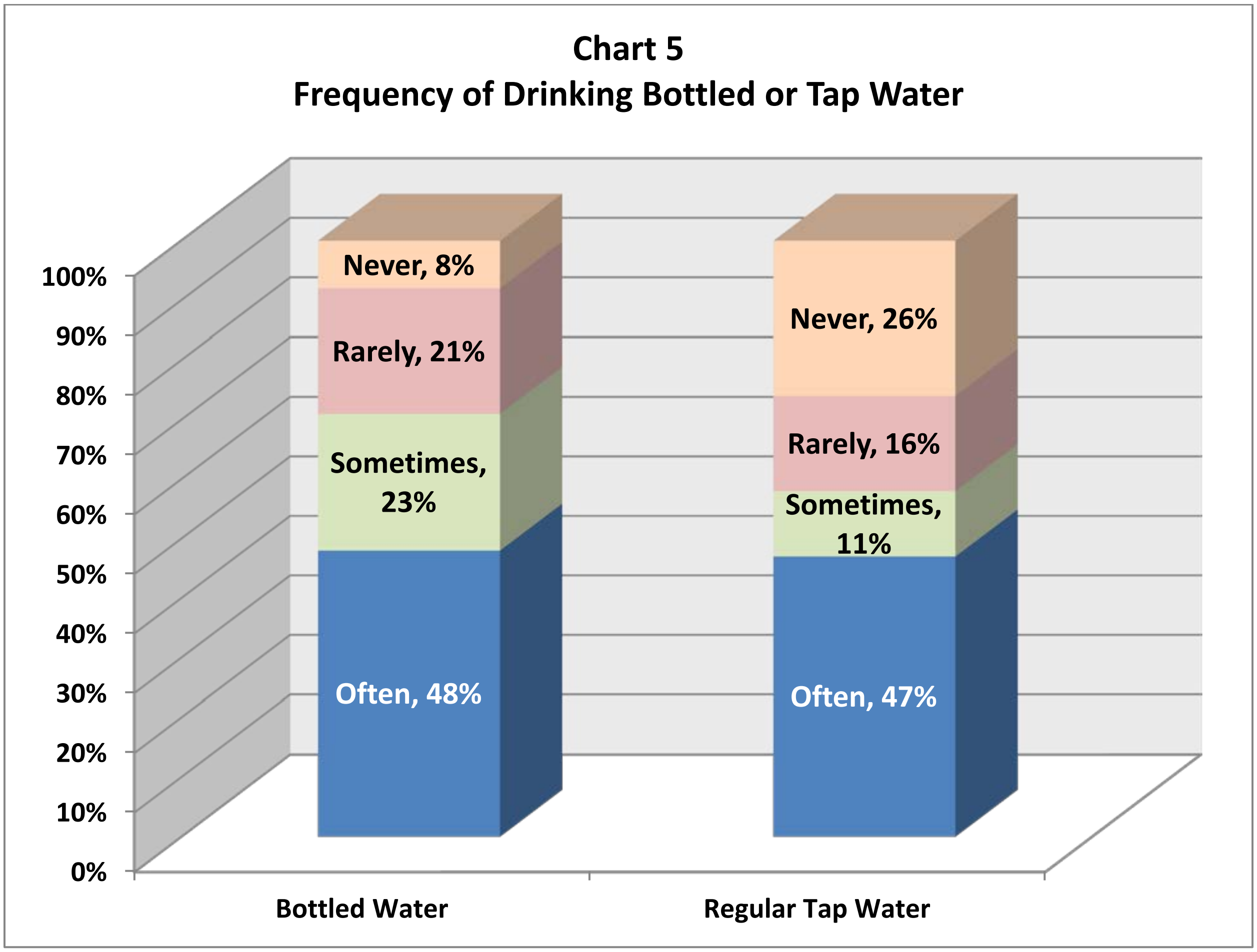
Water Reliability and Plans to Diversify Water Sources

SUMMARY: Among City of San Diego residents, more than three-fourths find that the current supply of water is either very reliable or somewhat reliable and can be consistently relied upon to meet the region's needs. This positive attitude toward water supply reliability is highly consistent with the results of the 2011 survey. Both the 2011 and 2012 survey years represent a clear increase in the perception of water supply reliability from the results of the 2004 survey. However, respondents are expressing a decreasing level of confidence in how they perceive the trend in the water supply.

Nearly three-fifths of respondents have trust in the ability of local water agencies to provide clean, safe, water for their customers. Almost one-third of respondents have either a great deal of trust or a good amount of trust in the ability of local water agencies to obtain water at reasonable prices.

Respondents identified the following efforts as particularly noteworthy on the part of the Water Authority in ensuring a safe and reliable water supply: water transfers and water importation from the Colorado River and the Imperial Valley, improved infrastructure, and seawater/ocean water desalination. One third of respondents indicate that the most important part of the Water Authority's Diversification Plan is seawater desalination followed by recycled water and the development of local reservoirs. Three-fifths of residents are in support of the San Diego County Water Authority's Diversification Plan. This represents a decline in support of the Diversification Plan from the results of the 2011 survey.

Water Reliability: Respondents tend to drink bottled water more frequently than they do tap water. More than seven in ten respondents (71 percent) either drink bottled water often or sometimes. By contrast, less than three-fifths (58 percent) drink tap water often or sometimes (**Chart 5**).



The following groups are more likely to drink bottled water often than are complementary groups:

- Residents with less education (less than a bachelor's degree – 57 percent versus bachelor's degree or more education – 42 percent).
- Blacks/African-Americans (68 percent) and Hispanics/Latinos (60 percent) versus Whites (40 percent).
- Larger households (3 or more persons – 52 percent versus households of 1-2 persons – 43 percent).

The following groups are more likely to drink tap water often than are complementary groups:

- Males (54 percent) versus females (39 percent).
- Homeowners (53 percent) versus renters (37 percent).
- In terms of ethnicity, Whites (56 percent) versus Hispanics/Latinos (38 percent), Blacks/African/Americans (32 percent), and Asians (26 percent).

Chart 6 demonstrates that there is confidence in the water supply to meet the region's needs while **Chart 7** shows that a relatively small percentage of the population feels that this reliability is improving. **Chart 6** shows that among residents of the City of San Diego, nearly four fifths (79 percent) find that the current supply of water is either very reliable (37 percent) or somewhat reliable (42 percent) and can be consistently depended upon to meet the region's needs. Under one-fifth (17 percent) find the water supply to be very or somewhat unreliable. This positive attitude toward water supply reliability is highly consistent with the results of the 2011 survey. In both the current survey and in the 2011 survey, confidence in the reliability of the water supply is higher than reported in the 2004 survey where 66 percent perceived the water supply to be either very or somewhat reliable.

- Younger and middle-aged residents (18-54 years of age) think that the water supply is very reliable (45 percent) more so than do older residents (55 years of age and older—30 percent).

Chart 7 demonstrates that respondents are expressing a decreasing level of confidence in the perceived reliability of the water supply – whether the supply is improving, worsening, or staying the same. Just over one-tenth (13 percent) of City residents feel that the trend in water supply reliability is improving – a decrease of 11 percent from the 24 percent level recorded in 2011. There is also a small increase among those who feel that the trend in the reliability of the water supply is worsening (22 percent in 2011 to 27 percent in 2012).

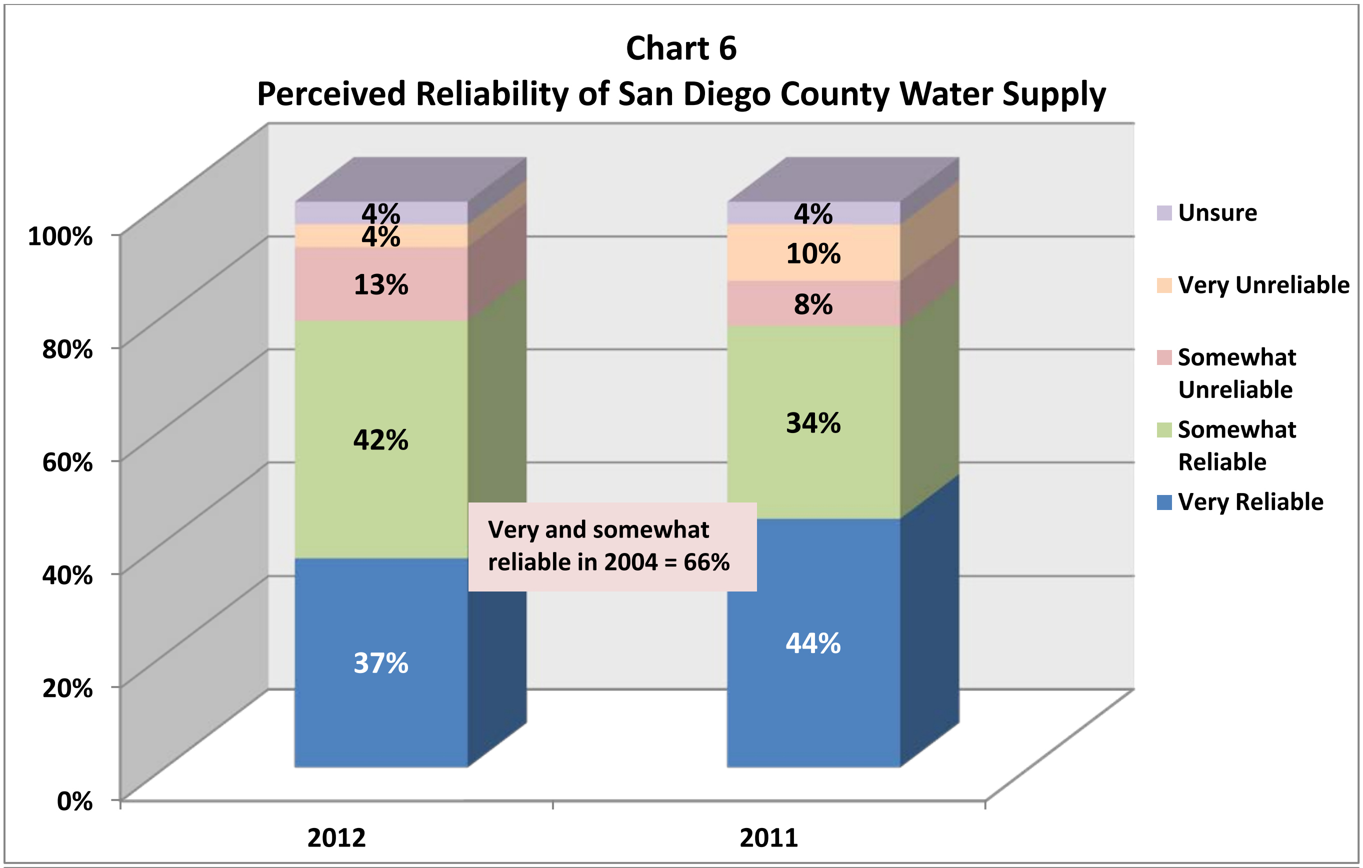


Chart 6
Perceived Reliability of San Diego County Water Supply
100%
80%
60%
40%
20%
0%
2012
2011
4%
4%
13%
42%
37%
4%
10%
8%
34%
44%
Very and somewhat reliable in 2004 = 66%
Unsure
Very Unreliable
Somewhat Unreliable
Somewhat Reliable
Very Reliable

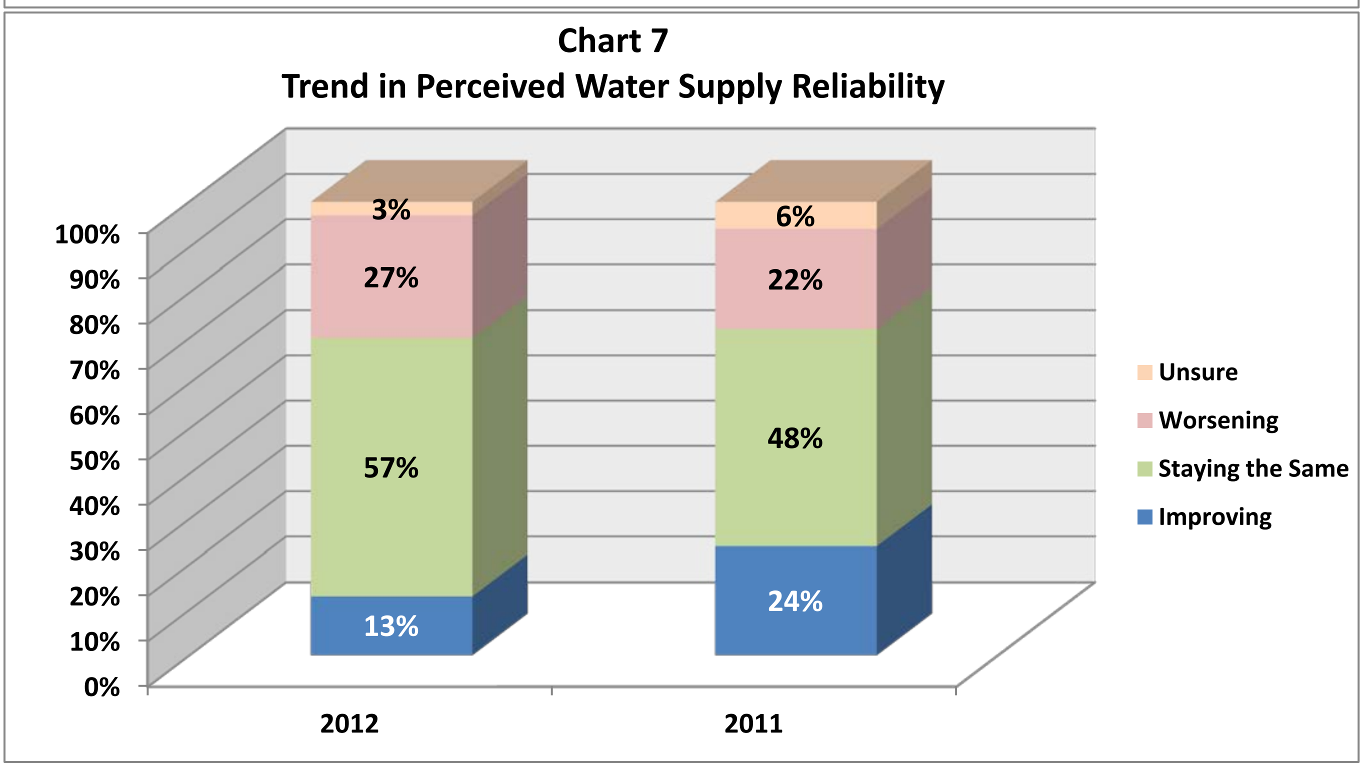


Chart 7
Trend in Perceived Water Supply Reliability
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2012
2011
3%
27%
57%
13%
6%
22%
48%
24%
Unsure
Worsening
Staying the Same
Improving

The following groups of respondents are more likely to think that the reliability of the County's water supply is worsening than do their complementary groups:

- Those who pay their own water bill (34 percent) versus those who do not (15 percent).
- Homeowners (33 percent) versus renters (20 percent).
- Long-term residents of more than 20 years (34 percent) see a worsening supply more so than do those who have resided in the County for 20 years or less (19 percent).

Chart 8 shows that nearly three-fifths of City respondents (59 percent) have a substantial amount of trust in the ability of local water agencies to provide clean, safe, water for its customers (20 percent a great deal of trust and 39 percent a good amount of trust). Only 12 percent expressed a lack of trust – not much trust (7 percent) and no trust at all (5 percent).

Regarding trusting local water agencies to deliver clean, safe water to their customers, the following groups indicate a good or great deal of trust in contrast to their counterparts:

- High income residents ($150,000 and more) –83 percent versus those earning less than $150,000—58 percent.
- Those who characterize their consumption of regular tap water as "often" (69 percent) indicate a good or great deal of trust in contrast to those who never use it (40 percent).

Chart 8
Public's Trust in Ability of Water Agencies to Provide Clean, Safe Water

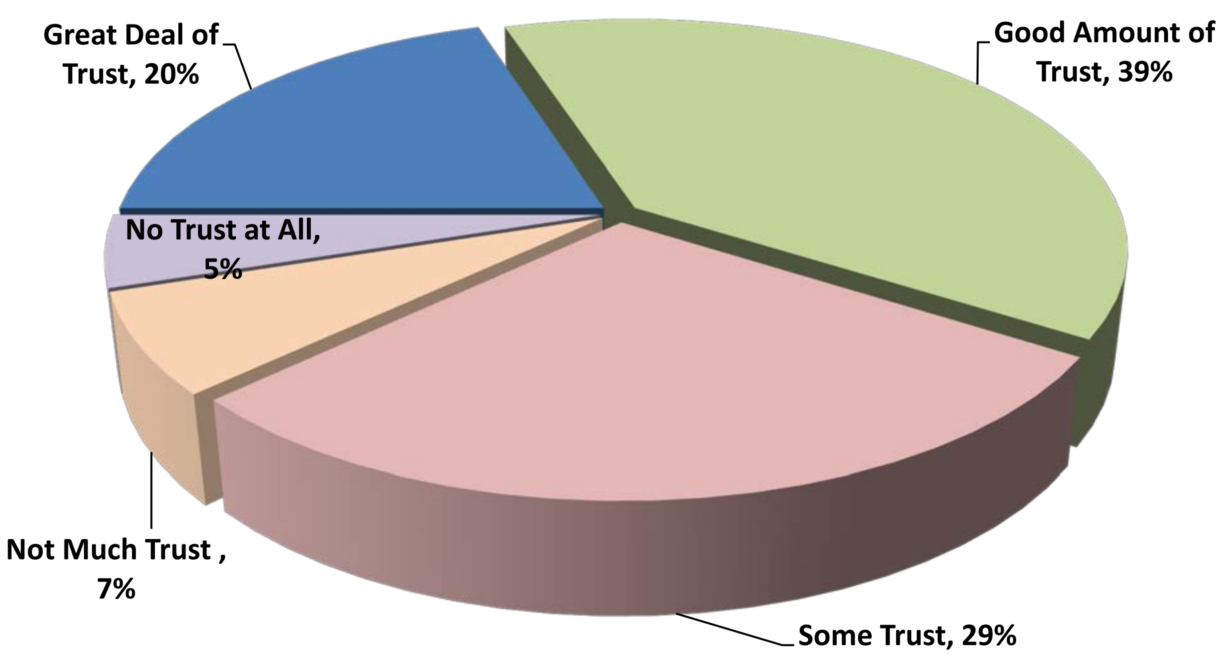
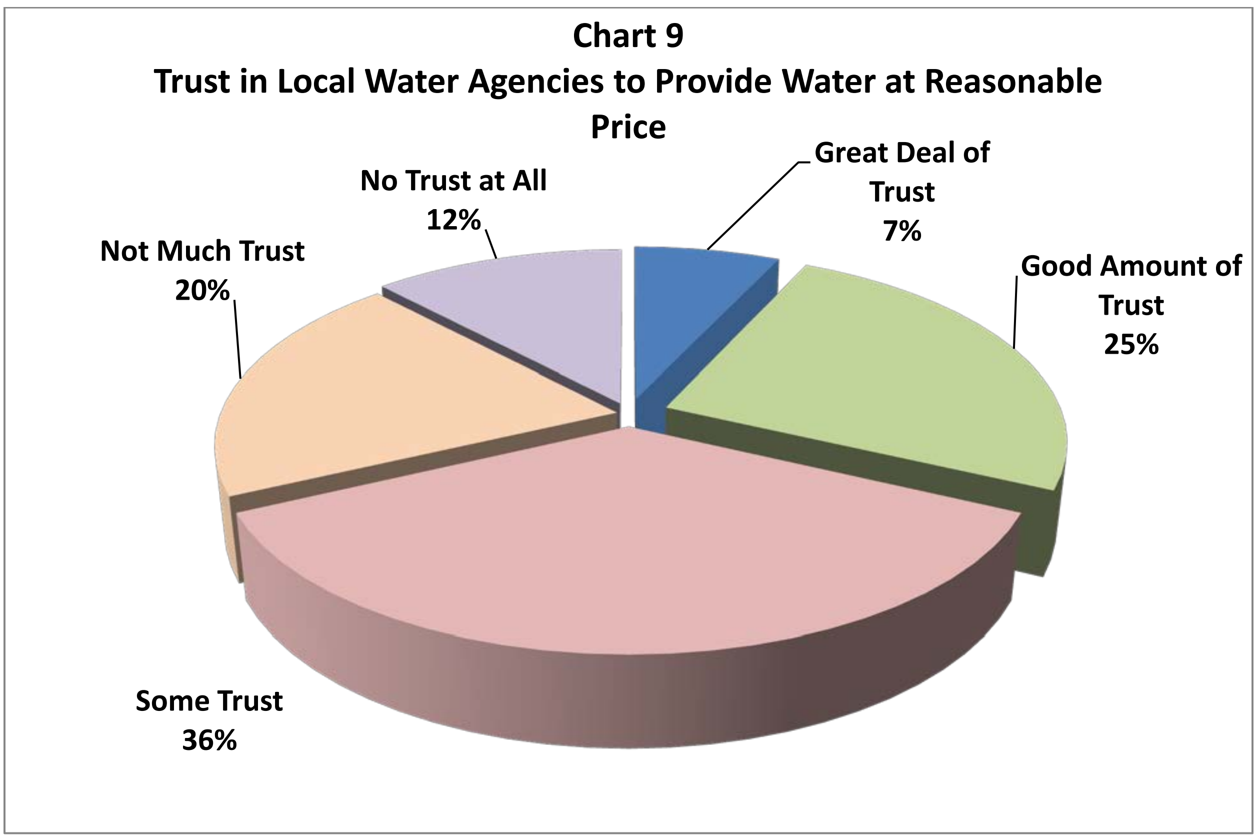


Chart 9 indicates that 32 percent of respondents have either a great deal of trust (7 percent) or a good amount of trust (25 percent) in the ability of local water agencies to obtain water at reasonable prices. About one-third (32 percent) lack trust in the ability of local water agencies to provide water at reasonable prices – not much trust (20 percent) and no trust at all (12 percent).

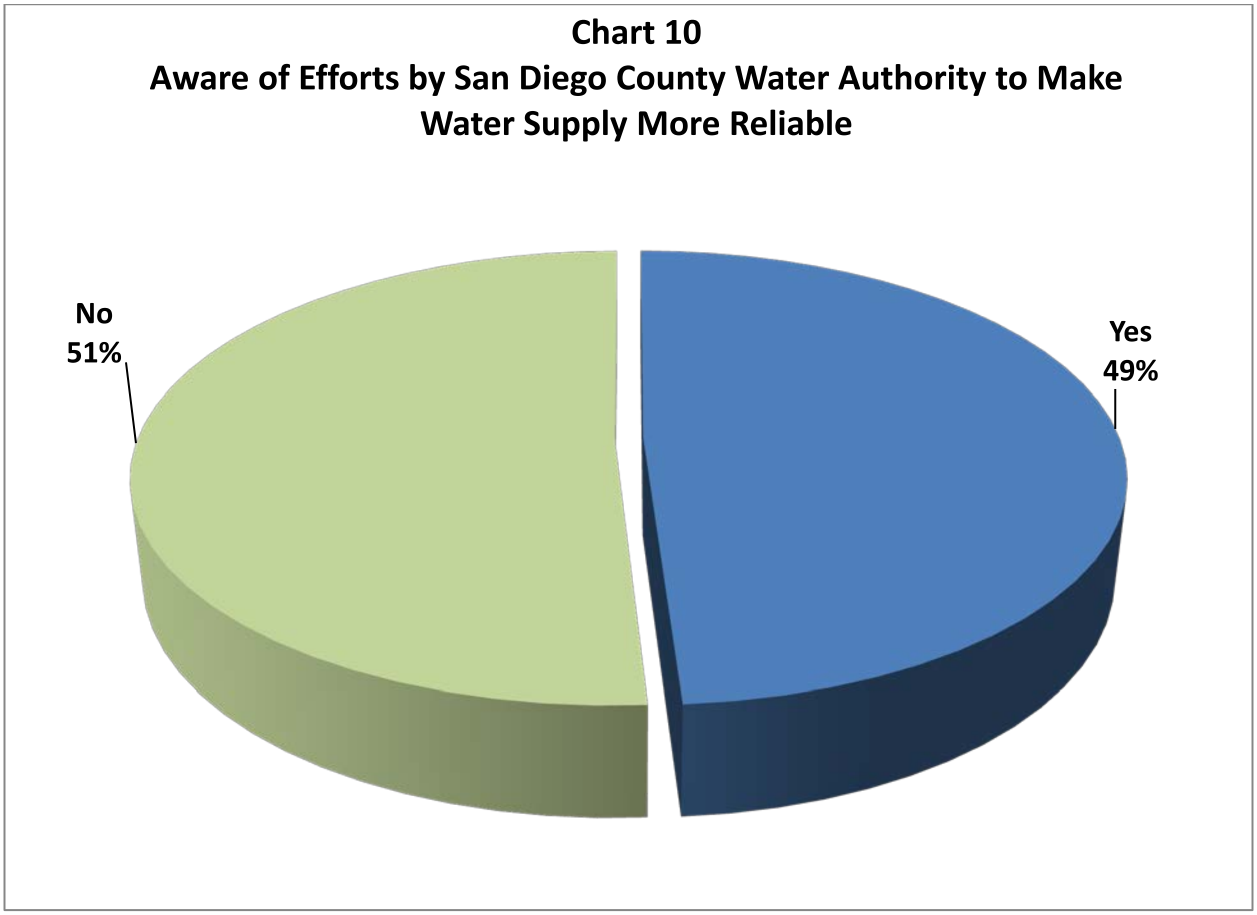
Trust in local water agencies to provide clean, safe water at reasonable prices also shows interesting differences among these groups of respondents:

- Asians (53 percent) show a great or good deal more trust that water prices will be reasonable than do Hispanics/Latinos (22 percent), Whites (31 percent) or Blacks/African-Americans (35 percent).
- Those who do not pay their own bills have a good or great deal of trust that water prices will be reasonable (42 percent) more so than do those who are responsible for making these payments (27 percent).
- Renters indicate a good or great deal of trust (35 percent) more so than do homeowners (29 percent).
- Younger residents indicate a good or great deal of trust (age 18-44 -- 44 percent) more so than do those residents 45 years of age or older (24 percent).
    - Using means, the mean age of residents with a great or good deal of trust in the reasonableness of prices is 46.6 years of age in contrast to those with not much or no trust at all (mean = 56.5 years of age)

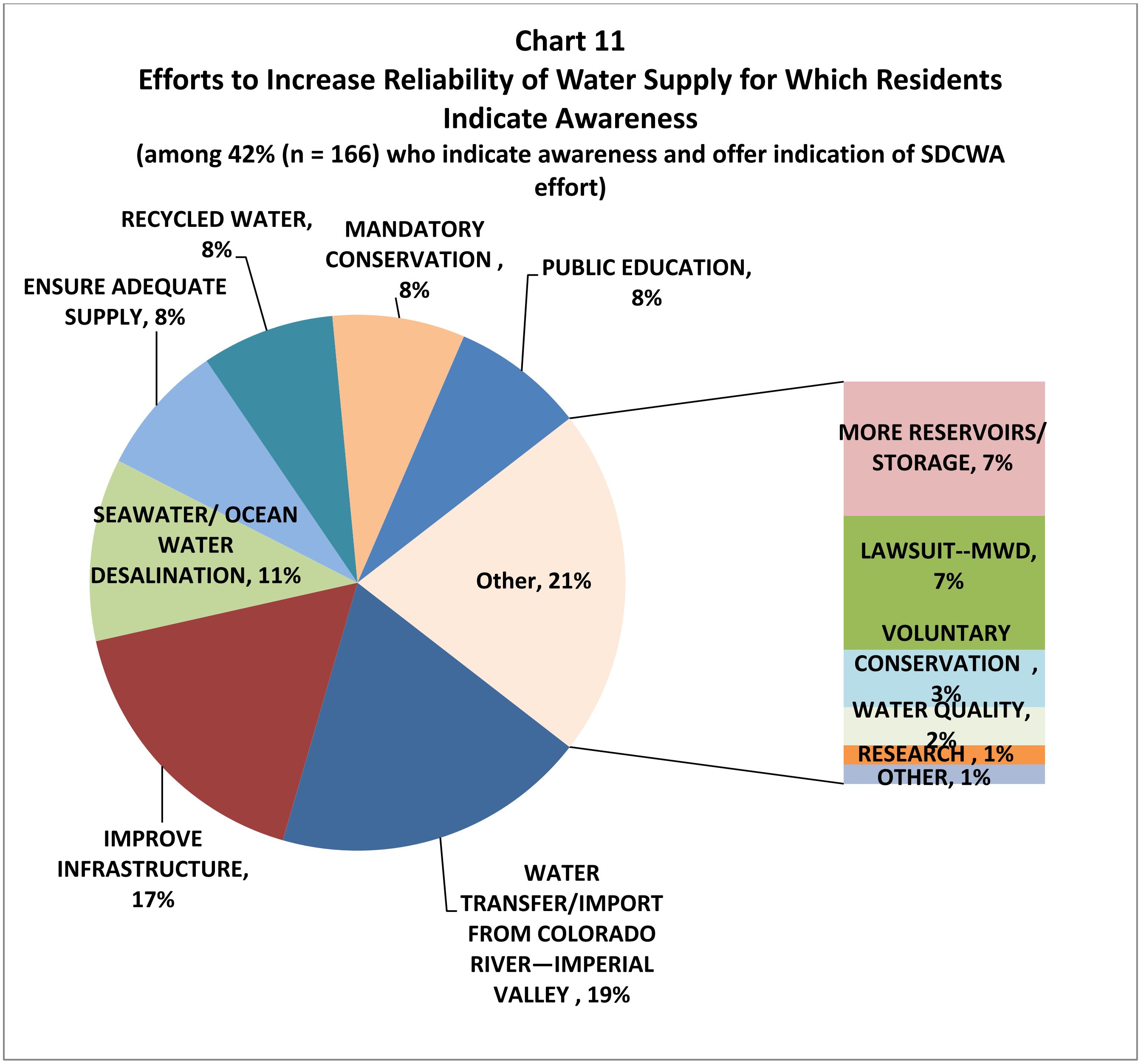


Nearly one-half of the respondents (49 percent) are aware of efforts by the San Diego County Water Authority to make the water supply more reliable (**Chart 10**).

- Frequent tap water consumers (often use = 58 percent) tend to be aware of efforts by the San Diego County Water Authority to make the water supply more reliable more so than those who sometimes, rarely or never drink tap water (40 percent).



Respondents, who indicated their awareness of such efforts, were asked to identify one of these efforts. Nearly one-fifth (19 percent) mentioned water transfer and water importation from the Colorado River and the Imperial Valley, another 17 percent mentioned improvement of infrastructure, and 11 percent indicated seawater/ocean water desalination. Other efforts mentioned by the respondents are public education, ensuring an adequate supply of water, recycled water, and mandatory conservation (each 8 percent) (**Chart 11**).



When asked which one thing the respondents were aware of, differences among groups again were in evidence.

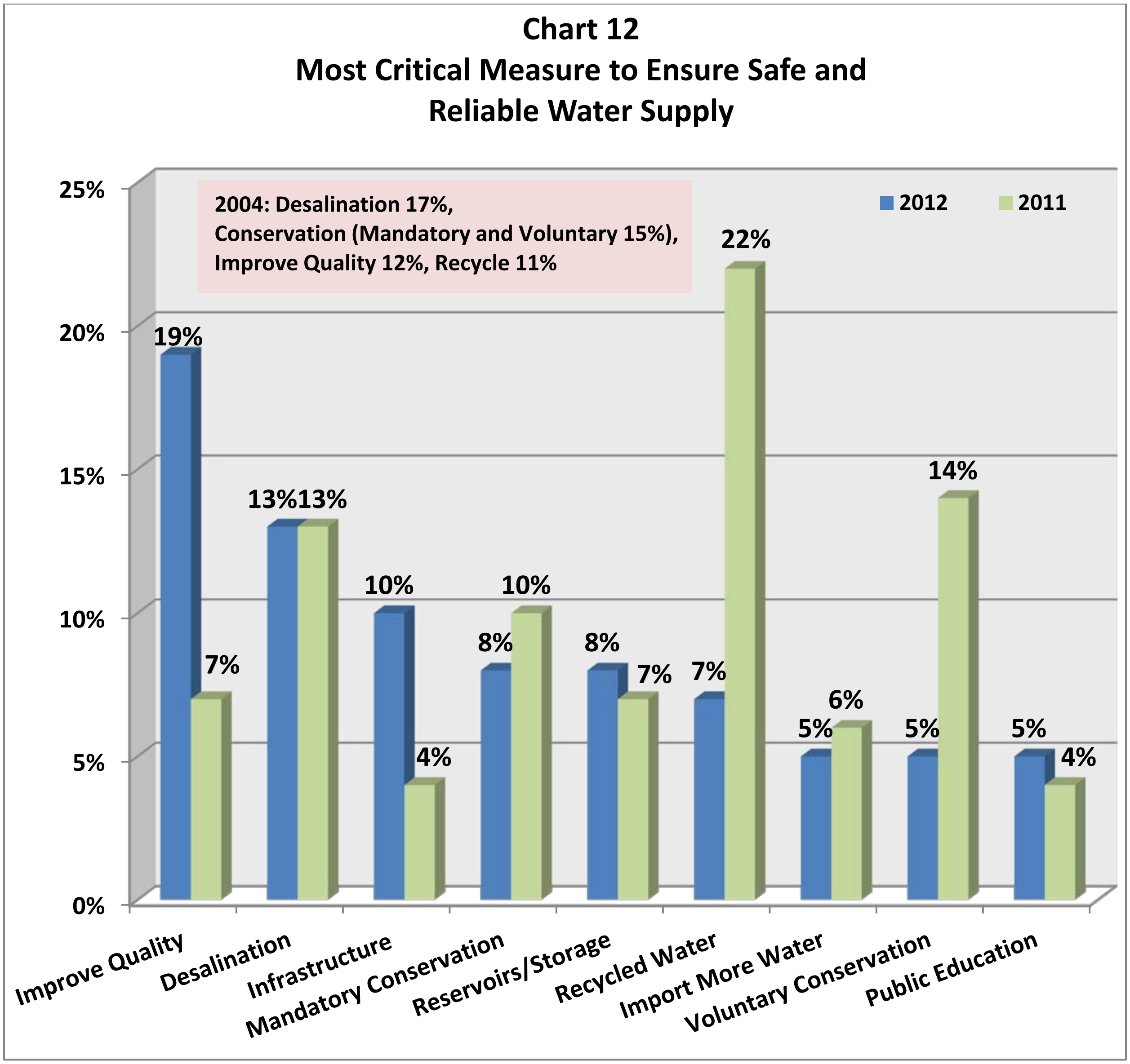
- Men indicated desalination (14 percent) more so than did women (6 percent).
- Men also named water transfers from the Colorado River (21 percent), infrastructure (19 percent) reservoirs (9 percent), and the MWD lawsuit (8 percent) more so than did women (14 percent, 12 percent, 1 percent and 4 percent, respectively)
- Women, on the other hand, listed public education (15 percent), mandatory conservation (14 percent) and voluntary conservation (10 percent) more so than did men (5 percent, 6 percent and 1 percent, respectively).

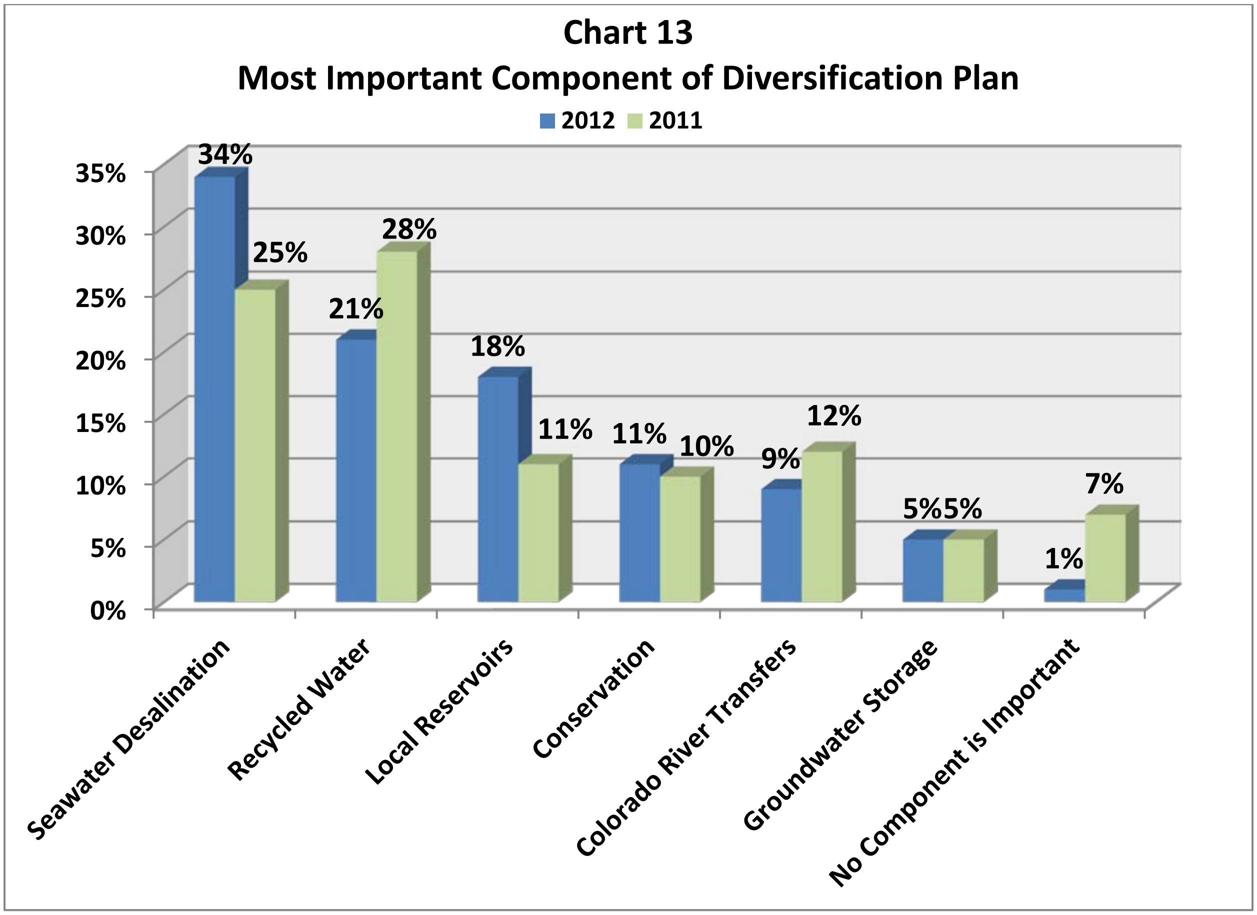
- Homeowners indicated water transfers (22 percent), infrastructure (19 percent), the MWD lawsuit (10 percent) and reservoirs (8 percent) more so than did renters (11 percent, 13 percent, 0 percent and 4 percent, respectively).
- Renters listed mandatory conservation (15 percent), recycling (13 percent), and voluntary conservation (7 percent) more than did homeowners (5 percent, 6 percent, and 3 percent, respectively).
- There were a substantial number of differences by ethnicity as follows:
  - Whites were highest among ethnic groups in mentioning water transfers (22 percent) and the MWD lawsuit (10 percent).
  - Blacks/African-Americans were highest for mandatory conservation (25 percent), public education (25 percent) and recycling (17 percent).
  - Hispanics/Latinos were highest for infrastructure (25 percent).
  - Asians were highest for desalination (29 percent) and reservoirs (14 percent).
- Larger households of 5 or more persons mentioned water transfers (39 percent), voluntary conservation (22 percent), mandatory conservation (17 percent), and public education (17 percent) more so than did households with 4 or fewer residents.
- Smaller households of 3 or less mentioned desalination (16 percent), recycled water (12 percent) and the MWD lawsuit (8 percent).

When respondents were asked what they think is the most critical thing that can be done to ensure a safe and reliable water supply for San Diego County residents and businesses, 19 percent indicated that the Water Authority could improve the quality of the water. This response was followed by seawater desalination (13 percent) and infrastructure improvement (10 percent). Since the 2011 survey, water quality and infrastructure issues have increased in importance as critical measures to ensure a safe and reliable water supply. Conservation (both mandatory and voluntary combined) has declined in importance to 13 percent – a decline of 11 percent since the 2011survey. The 2012 results represent a return to the 2004 level when only 15 percent of City respondents regarded conservation as important to safeguard the water supply. Recycled water has lost ground as a critical issue during the current survey period, falling to 7 percent from the 2011 high of 22 percent. Desalinated water remains steady as a critical issue in all three survey periods – 2012, 2011, and 2004 (**Chart 12**).

- Those who never drink regular tap water think that improving water quality is the most critical thing that the Water Authority can do (33 percent for those who never drink tap water versus 14 percent for those who drink tap water rarely, sometimes or often).

Diversification Plan: Over one third of respondents indicate that the most important part of the Water Authority's Diversification Plan is seawater desalination (34 percent) followed by recycled water (21 percent), and the development of local reservoirs (18 percent). Seawater desalination remains the most important component of the Diversification Plan in the view of the respondents. In fact, those who support desalination increased by 9 percent since 2011 when 25 percent felt that desalination was the most important component of the Diversification Plan. Respondents indicate that recycled water has a declining level of importance as a component of the Diversification plan (28 percent in 2011 versus 21 percent in 2012). Local reservoirs have gained substantial ground increasing from 11 percent in 2011 – a 7 percent gain over the current survey results (**Chart 13).**

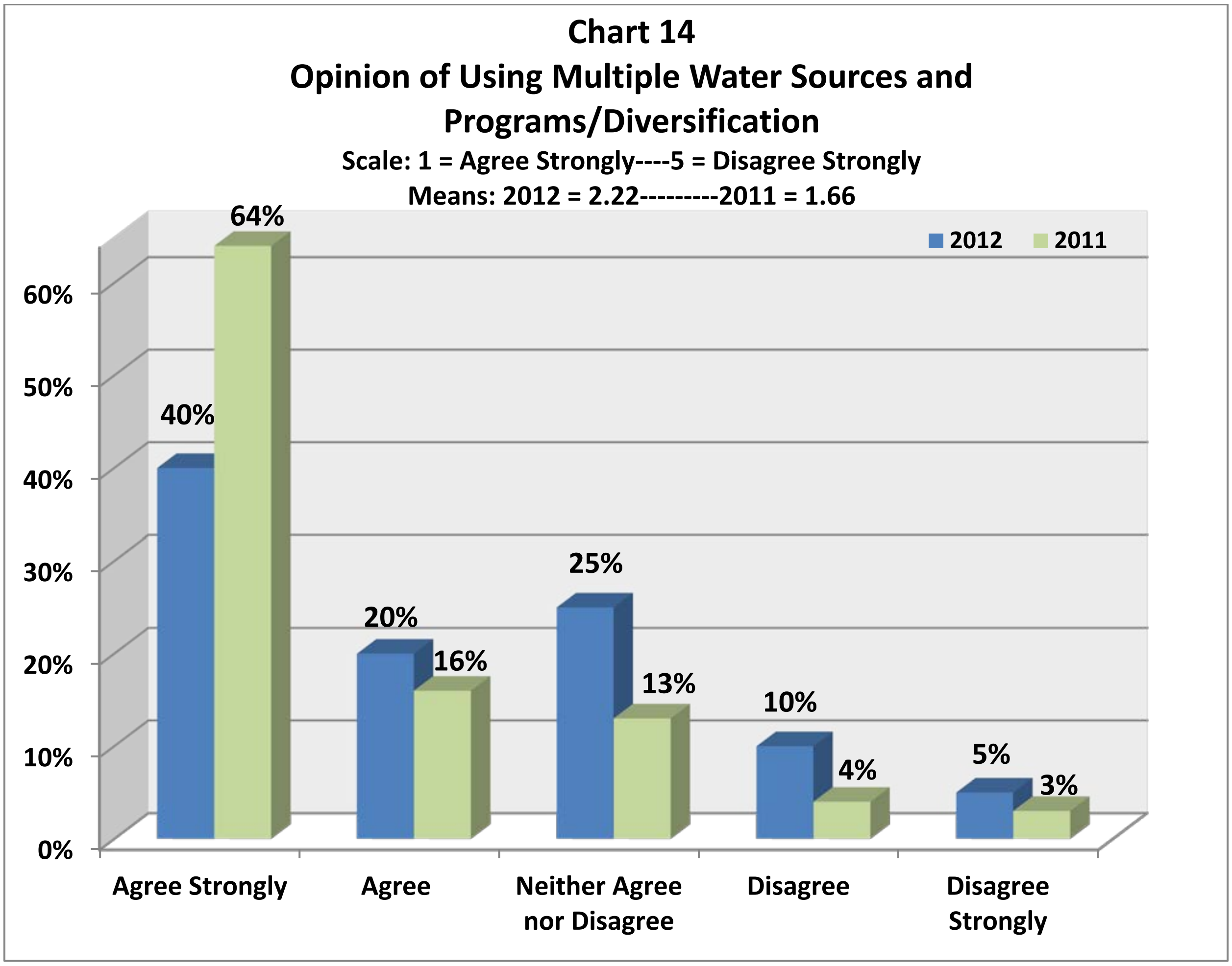




Differences exist among groups pertaining to the most important components of the Water Authority's Diversification Plan.

- Households of 4 or more persons are stronger in their indicated importance of expanding local reservoirs (25 percent) and water transfers (11 percent) versus households of 3 or less (15 percent and 8 percent, respectively).
- Smaller households of 3 or less consider recycled water (21 percent) and conservation (12 percent) to be more important than do larger households (16 percent and 9 percent)

Chart 14 shows that three-fifths (60 percent) of residents are in support of the San Diego County Water Authority's Diversification Plan with ratings of strongly agree (40 percent) and agree (20 percent). This represents substantial decline in support of the Diversification Plan from the results of the 2011 survey where 80 percent either strongly agreed or agreed that the Diversification Plan would improve water supply reliability. The mean rating of 2.22 (based on a scale of 1 to 5, where 1 = strongly agree and 5 = strongly disagree) confirms this declining level of support from the 2011 finding where the mean rating was 1.66.



Significant differences among groups regarding agreement or disagreement with the Diversification Plan are as follows:

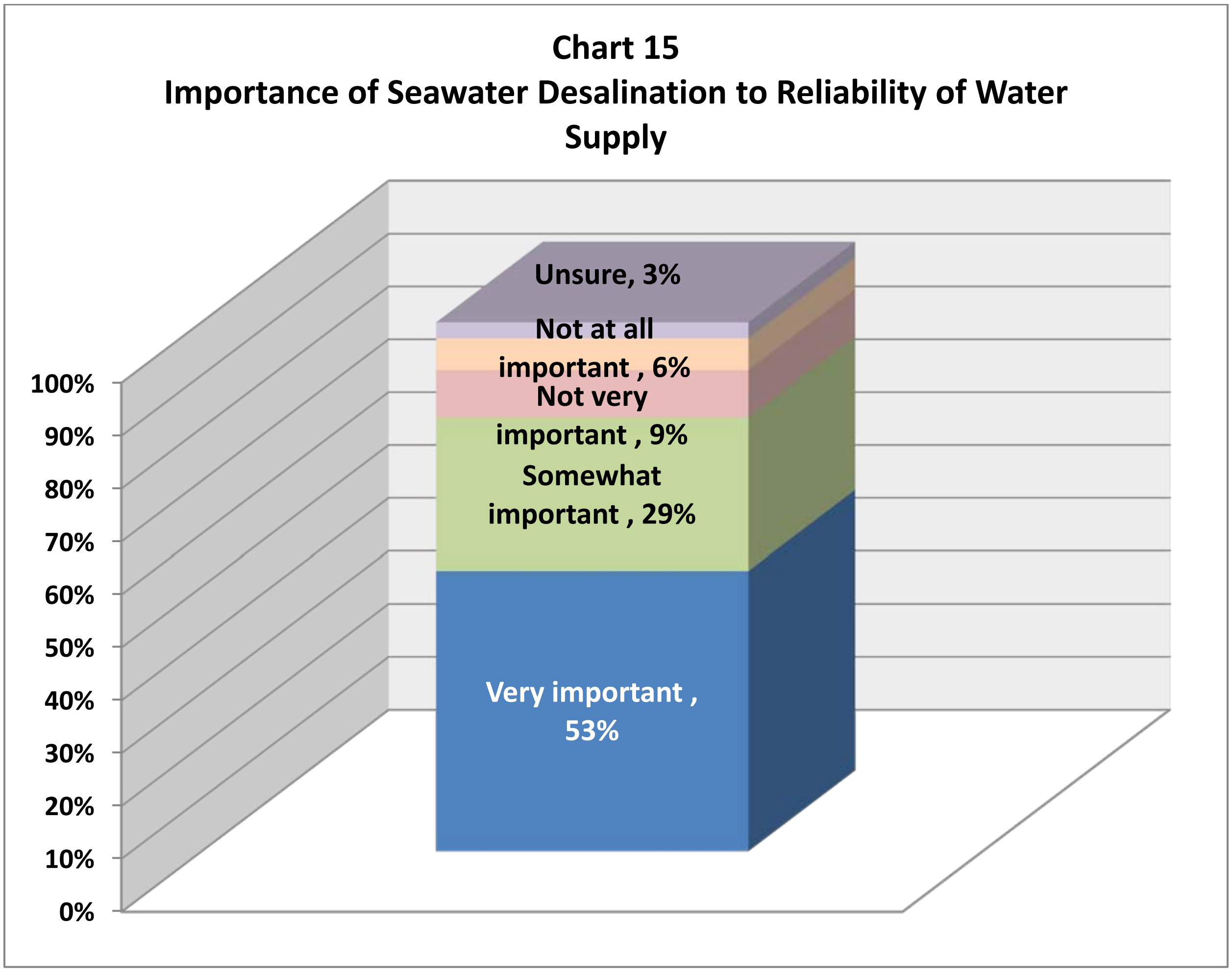
- One the 1-5 scale, there is greater agreement among more educated residents (mean of 2.06 for those with one year or more of graduate school) versus among those with a high school diploma or less (2.72).
- Income is lower by approximately $30,000 among those who disagree strongly with the Diversification Plan compared to all other agreement or disagreement categories.

Seawater Desalination

<u>SUMMARY</u>: Over four-fifths of respondents feel that seawater desalination is important to the reliability of the region's water supply. Respondents are most favorably influenced toward desalination by the following message: "Desalinated water is a drought-proof local supply of water." The least influential message is as follows: "Desalinated water is competitive with the cost of developing other new sources of water supplies."

Nearly two-thirds expressed a willingness to pay something more per month to add seawater desalination to the water supply—almost three-fifths indicating $5 or more. In 2011, less than half indicated a willingness to pay $5 for a more general benefit of increased water supply reliability. Among those who indicated a precise amount, the mean additional amount they are willing to pay is $13 per month and the median amount is $10.

Chart 15 demonstrates that over four-fifths (82 percent) of respondents feel that seawater desalination is important to the reliability of the Water Supply (53 percent -- very important and 29 percent -- somewhat important).



- Males think that desalination is more important than do females--59 percent of men think that desalination is very important in contrast to 44 percent of women.

Five statements were read to the respondents regarding desalination. After each statement, respondents were asked how influenced they were by these statements. The response was based on a scale of 1 to 5, with 1 being very favorably influenced toward desalination and 5 being not favorably influenced at all. The most influential statements were “Desalinated water is a drought-proof local supply of water” (mean of 1.95), “Desalinated water reduces the San Diego region’s dependence on supplies from the Metropolitan Water District” (mean of 1.99), and “Desalination will reduce the region’s demand for supplies of imported water from Northern California and the Colorado River” (mean of 2.05). The least influential statement is “Desalinated water is competitive with the cost of developing other new sources of water supplies” (mean of 2.55). In all statements except the least influential one, about two-thirds of respondents (range of 67 to 69 percent) indicated that they were either very influenced or somewhat influenced by the statement. In the least influential statement, only 46 percent were either very influenced or somewhat influenced (**Chart 16**).

In testing these messages about desalination, a number of differences among the groups became evident:

- Men are more favorably influenced by the messages about desalination being drought-proof (61 percent very favorably influenced versus 43 percent for women). Men are also more favorably influenced by the message about desalination reducing the region’s dependence on imported water (53 percent very favorably influenced for men versus 42 percent for women) and by the message about desalination reducing dependence upon MWD (55 percent for men versus 43 percent for women).
- Spanish language survey respondents are very or somewhat favorably influenced by the message about the cost of desalination (80 percent) more so than are those who took the survey in English (50 percent).
- Interestingly, cost registers more strongly with those who do not pay for their own water usage (63 percent very or somewhat favorably influenced) versus those who do pay their own bill (46 percent).
- The message about desalination reducing the dependence on MWD carries more weight with those residents who use only their cell phones (74 percent very or somewhat favorably influenced) versus those who use land line telephones at least some of the time (64 percent).

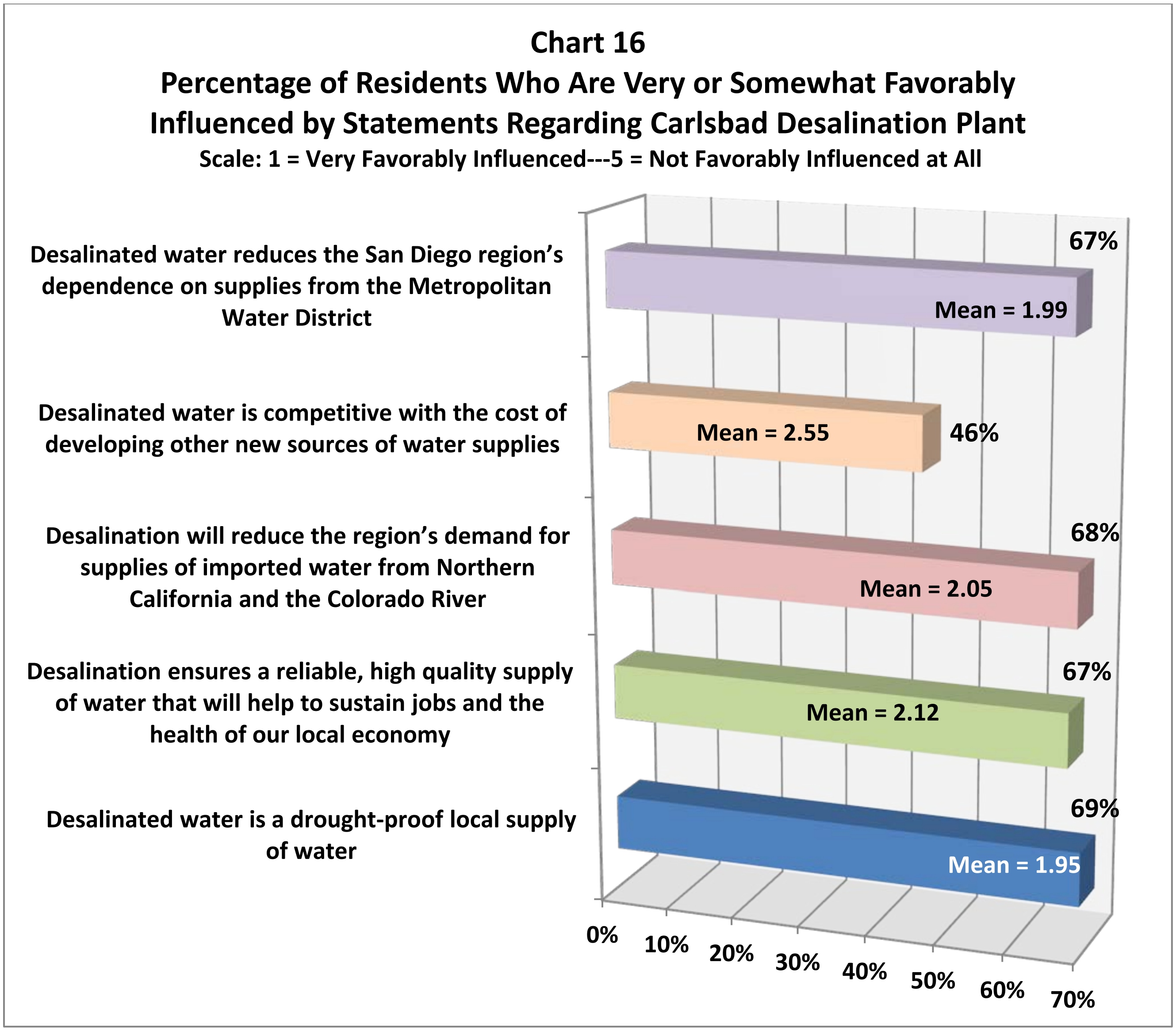
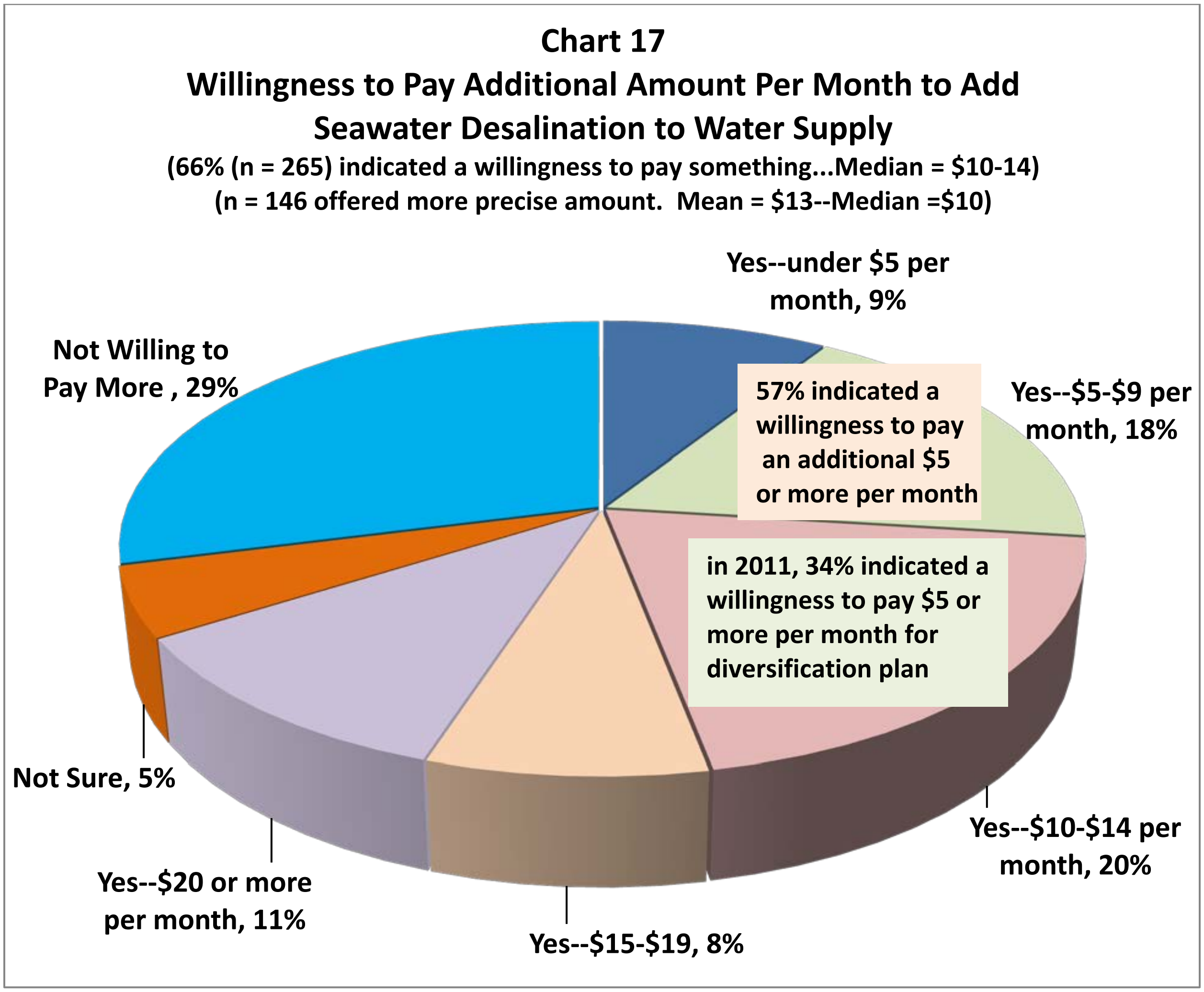


Chart 17 shows that nearly two-thirds (66 percent) expressed a willingness to pay something more per month to add seawater desalination to the water supply. Nearly three-fifths (57 percent) are willing to pay an additional $5 or more per month. Among those who indicated a precise amount, the mean additional amount they are willing to pay is $13 per month and the median amount is $10.

Significant differences among groups regarding willingness to pay an additional amount for desalination are as follows:

- Whites are willing to pay an additional mean amount of $15 per month and Hispanics/Latinos and Asians are both willing to pay $10.
- Single person households are willing to pay $9 per month and 3 or more person households are willing to pay $12, but 2-person households expressed a willingness to pay $17 per month.



Attitudes about Water Conservation

SUMMARY: Water conservation is a significant component in San Diego County's water supply plans. One-fourth of respondents indicated that their household water usage has decreased over the past year. This represents a small decline from those who indicated that they decreased their water usage in 2011 but is offset by a similar decline among those whose use has increased. Among those who indicated that their household water usage has declined, nearly one-half did so because they feel that reducing water usage is the "right thing to do." In 2011, a somewhat smaller (but still substantial) percentage was motivated to reduce water usage because it is the "right thing to do." Over one-fourth (27 percent) were motivated to reduce water usage because they are watching their budget and this represents a decline of 8 percent since 2011 when 35 percent were so motivated by budgetary concerns to reduce their water usage. The vast majority—almost 90 percent—indicated that their reduced water usage is permanent and this is consistent with the 2011 finding.

It is most encouraging that when water agencies no longer take an active role in restricting water use, respondents who have reduced their water usage during the past year indicate that they are not likely to increase their water use (approximately one-fifth will increase usage). On the other hand, a less cool and less wet year would lead to nearly three-fifths of those who have reduced their water use during the past year returning to higher usage. Under most conditions and circumstances, these views about higher water usage in the future parallel the views of the 2011 survey respondents.

Virtually all of the respondents (95 percent) think that it is their civic responsibility to use water as efficiently as possible. In the current survey period as well in 2011, respondents regard water conservation as a greater civic responsibility than serving on a jury. In the current survey as well as in 2011, water conservation is close to the same level as recycling used materials in terms of perceived civic responsibilities. Voting in public elections and not littering/not polluting are strongly regarded as higher civic obligations than water conservation.

Water Use: Past Year **Chart 18** shows that over one-fourth of respondents (26 percent) indicated that their household water usage has decreased over the past year. This represents a small decline of 2 percent among those who indicated that they decreased their water usage in 2011 (28 percent). However, there is also a decline of 4 percent since 2011 among those who indicate that their water usage increased (18 percent in 2011 to 14 percent in 2012). These differences are reconciled by those who indicated that their water usage has remained the same (59 percent in 2012 versus 48 percent in 2011).

Change in water usage during the past year is further informed by the following differences among groups of residents:

- Cell-only users indicate that 10 percent of them have increased their water usage during the past year in contrast to 15 percent of land line users.
- Women have increased water usage (19 percent) more so than have men (10 percent).

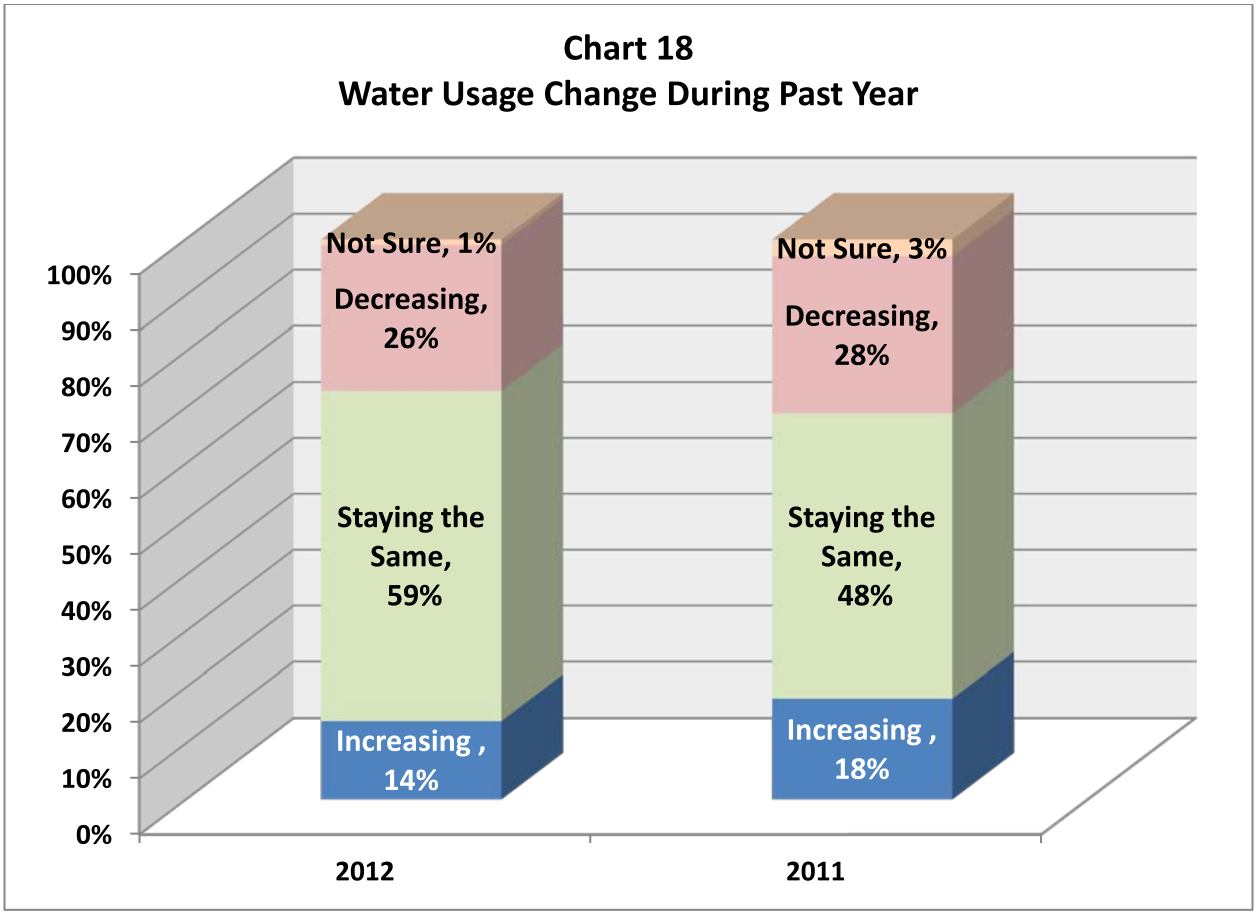


Chart 19 indicates that, among those who indicated that their household water usage has declined, nearly one-half (48 percent) – a dominant plurality-- feel that reducing water usage is the "right thing to do." In 2011, a somewhat smaller (but still substantial) percentage was motivated to reduce water usage because it is the "right thing to do" (31 percent). Over one-fourth (27 percent) were motivated to reduce water usage because they are watching their budget and this represents a decline of 8 percent since 2011 when 35 percent were so motivated by budgetary concerns to reduce their water usage. Among those who indicated that their household water usage has declined, a considerable majority (89 percent) thinks that their reduced use of water is permanent (**Chart 20**). This finding is consistent with the result of the 2011 survey – 82 percent believed their reduction in water use to be permanent.

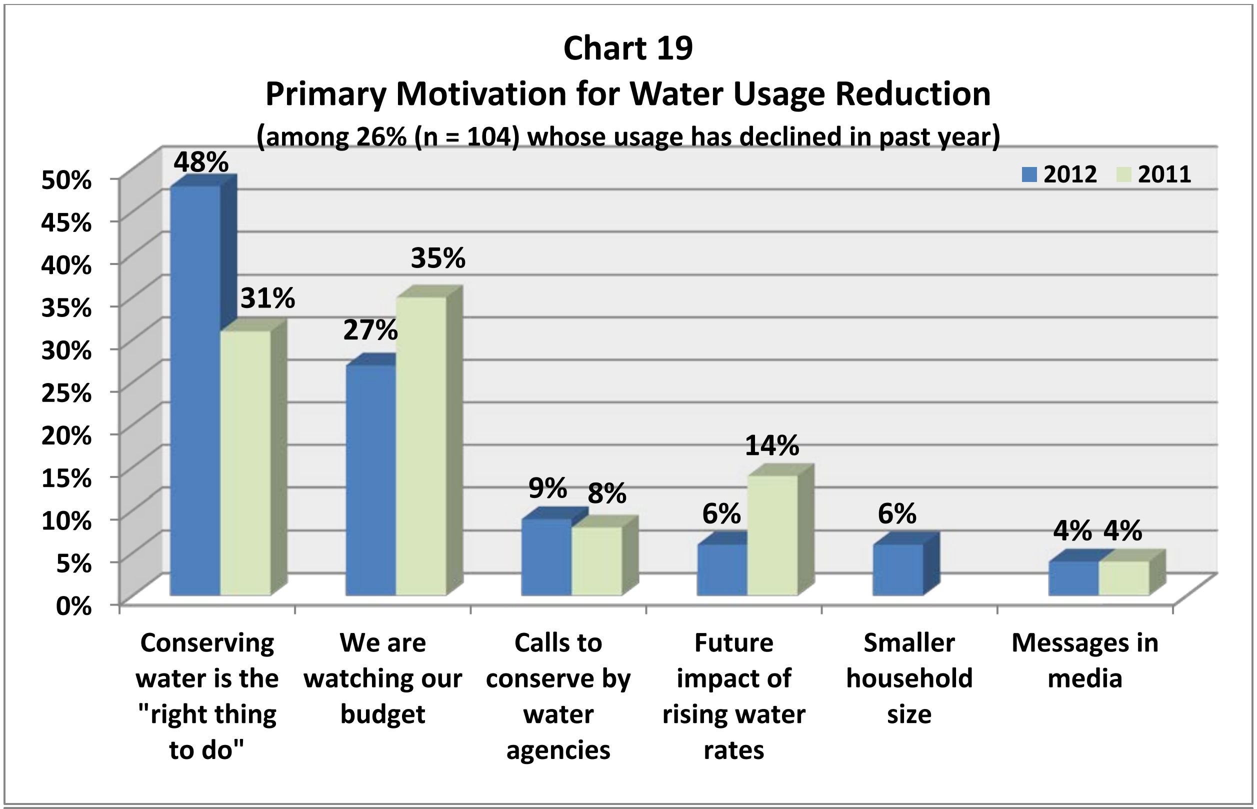


Chart 19
Primary Motivation for Water Usage Reduction
(among 26% (n = 104) whose usage has declined in past year)
2012
2011
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
48%
31%
27%
35%
9%
8%
6%
14%
6%
4% 4%
Conserving water is the "right thing to do"
We are watching our budget
Calls to conserve by water agencies
Future impact of rising water rates
Smaller household size
Messages in media

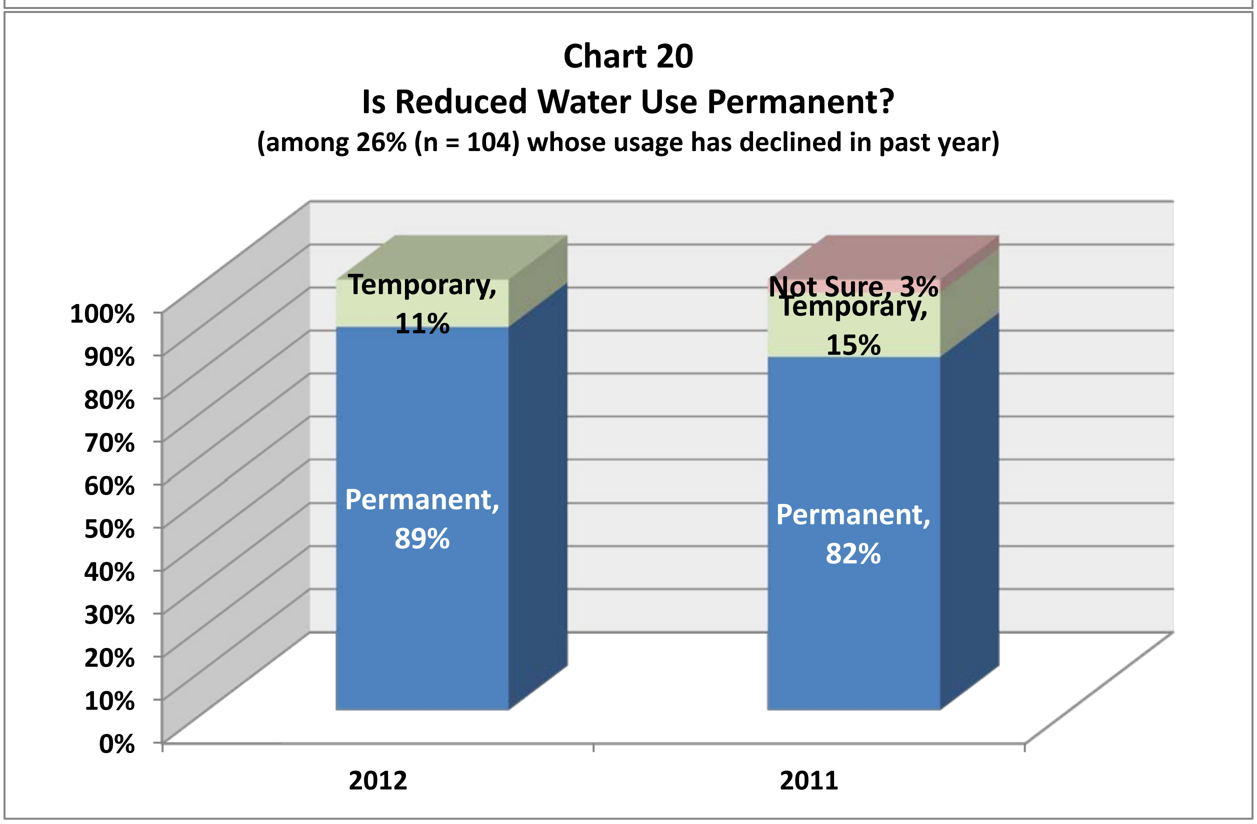
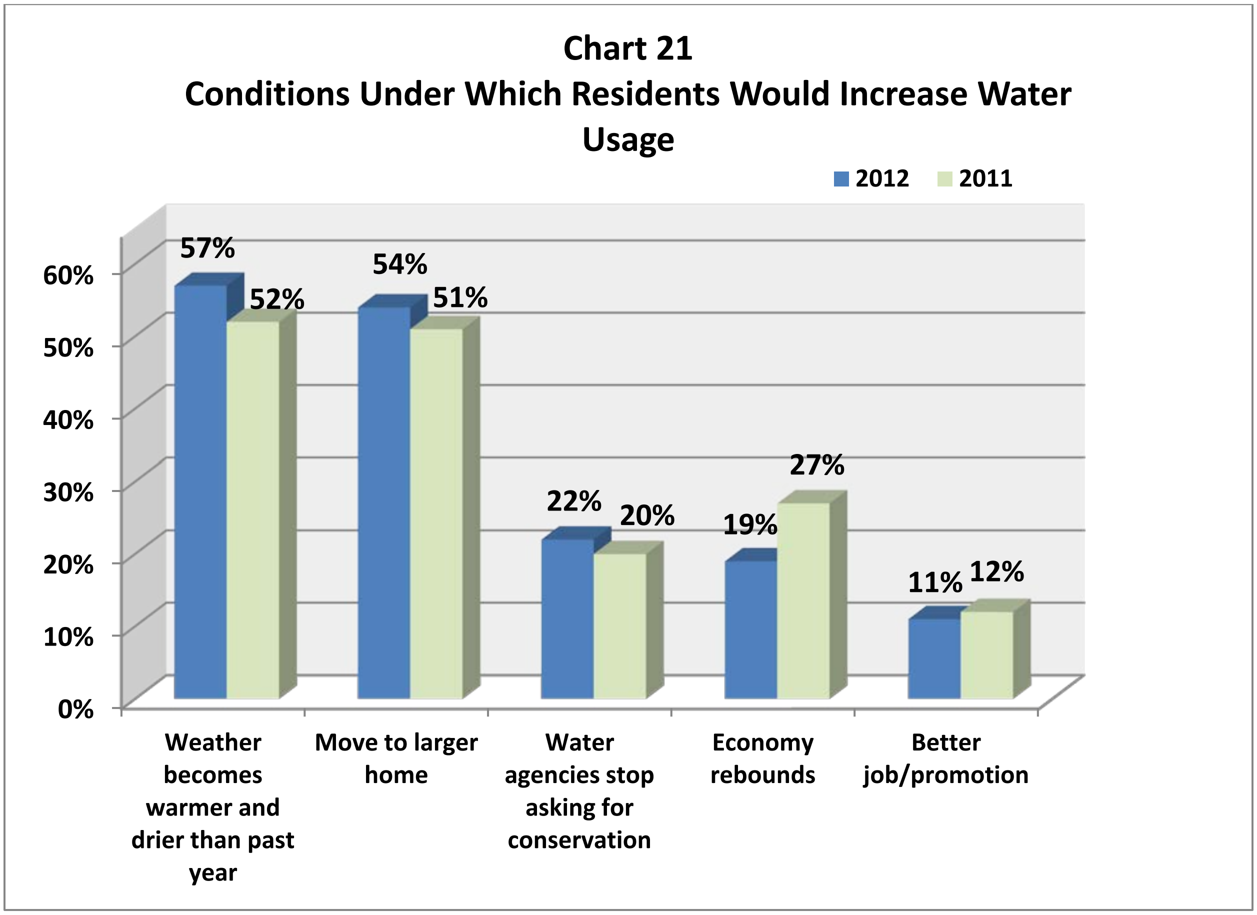


Chart 20
Is Reduced Water Use Permanent?
(among 26% (n = 104) whose usage has declined in past year)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Temporary, 11%
Permanent, 89%
Not Sure, 3%
Temporary, 15%
Permanent, 82%
2012
2011

Permanent reductions in water use are indicated more by the following groups:

- College degree or more (95 percent) versus less than a college degree (78 percent).
- Those who often or sometimes drink tap water (95 percent) versus rarely or never drink tap water (78 percent).

Water Use in the Future: Respondents were asked to indicate if they will or might increase their water usage if various conditions and situations were to prevail. Among the findings reported in **Chart 21**, it is most encouraging that when water agencies stop asking for residents to practice conservation there is no surge in water use expected (22 percent). On the other hand, a less cool and less wet year would lead to nearly three-fifths (57 percent) of the respondents returning to higher usage.



Understandably, when families move to a larger home, respondents indicate that they will increase water usage (54 percent). When the economy rebounds (19 percent) or the respondent obtains a better job or a job promotion (11 percent), residents indicate that they are not likely to increase their water usage. These various projections on the part of the current respondents parallel those that were made in 2011except in the area of an economic rebound. In this case, there is a decline of 8 percent from the 27 percent in 2011 who indicated they would use more water as the economy improves.

The following subgroups are more inclined to increase their water usage when the weather becomes warmer and drier:

- Women are more inclined to increase their usage if the weather turns warmer and drier (65 percent versus 52 percent for men).
- More frequent drinkers of bottled water are also more inclined to increase their water usage if the weather becomes warmer and drier—65 percent of those who drink bottled water often versus 46 percent of those who drink bottled water rarely or never.

The following subgroups are more likely to increase their water usage when the economy rebounds:

- Women (26 percent) more than will men (15 percent)
- Renters more than will homeowners (28 percent versus 15 percent).
- Those residents with one year of college or less (28 percent) plan to increase their water usage more so than do those with a college degree or more (14 percent).
- Blacks/African-Americans (33 percent) and Hispanics/Latinos (28 percent) indicate that they are more likely to increase their usage in a recovering economy than are Whites (15 percent) and Asians (17 percent).
- Incomes of under $25,000 per year (36 percent) versus $25,000 and less than $75,000 (24 percent) and $75,000 or more (12 percent)
    - Mean income among those who plan to increase their usage in a rebounding economy is $67,000 annually in contrast to $85,000 among those who do not think that they will increase usage.
- Ages 44 and under (27 percent) versus those residents who are 45 years of age or more (15 percent).

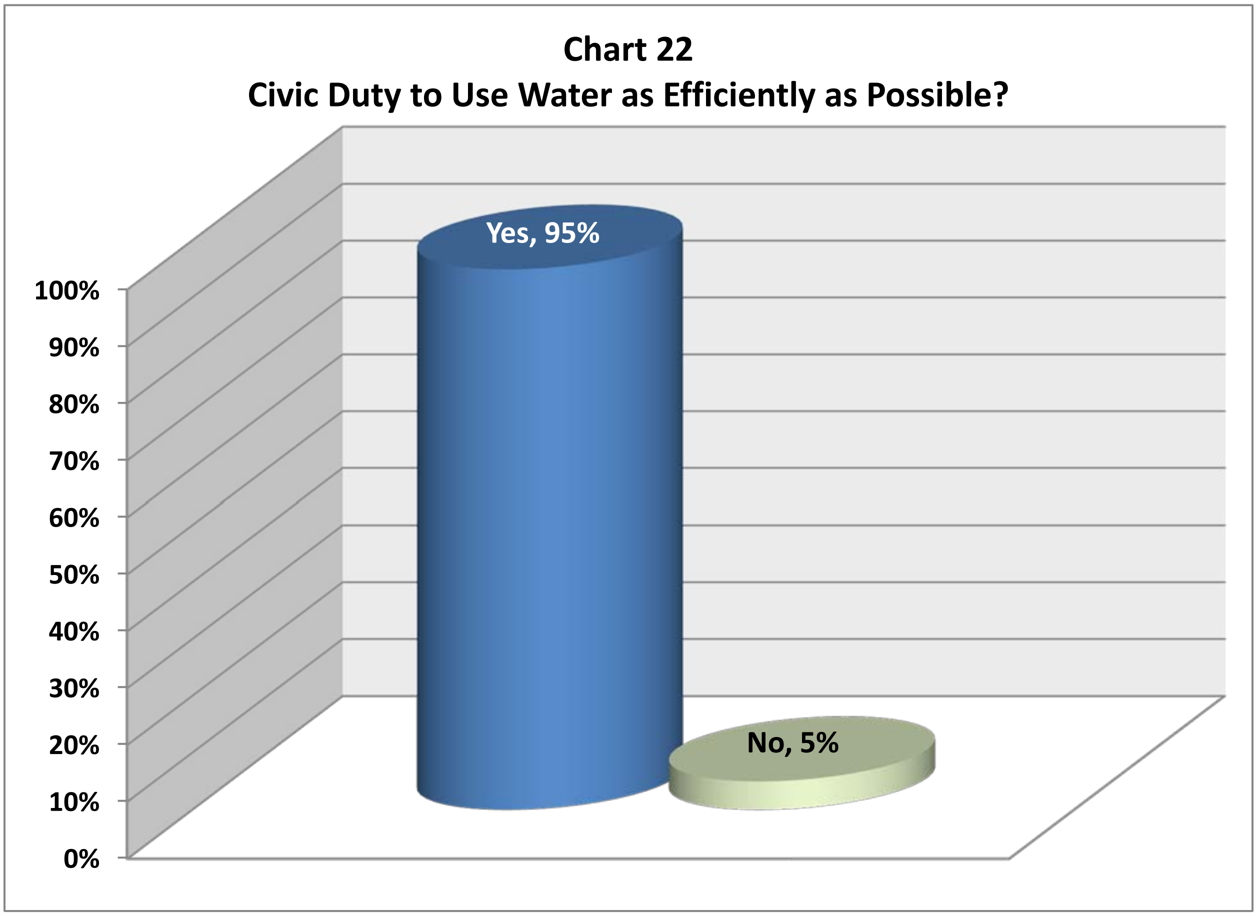
If water agencies were to stop asking their customers to conserve, the following groups would be more likely to increase their water usage:

- Women (28 percent) in contrast to men (19 percent)

The other three possible events—a larger home, better job, or larger family are personal events in contrast to those above and share many similarities. In particular, renters, apartment and condominium dwellers, those who do not pay their own water bills, residents 18-44 years of age, and non-Whites all indicate that, if these events were to happen in their lives, their consumption of water is more likely to increase than if these events were to occur to other residents of the City of San Diego.

Water Conservation as a Civic Responsibility: Chart 22 shows that virtually all of the respondents (95 percent) think that it is their civic responsibility to use water as efficiently as possible.

- Those who never drink bottled water think of water conservation as less of a civic responsibility (85 percent) than those who drink it at least rarely (96 percent).



Voting is seen as a civic responsibility differently by the following groups:

- Residents 45 years of age or older demonstrate a 95 percent rate for voting being a civic responsibility in contrast to those under 45 years of age (86 percent).
- Whites (95 percent) and Asians (100 percent) are more inclined toward voting being a civic responsibility than are Hispanics/Latinos (88 percent) or Blacks/African-Americans (85 percent).

Regarding jury duty as a civic responsibility,

- Whites (91 percent) and Asians (90 percent) more than Hispanics/Latinos (84 percent) and Blacks/African-Americans (76 percent).

Not Polluting and Not Littering are seen as a civic responsibility by:

- Those who drink bottled water often (99 percent) in contrast to those who never drink bottled water (91 percent).
- Residents 25 years of age and older (98 percent) versus those 18-24 years of age (82 percent).
  - Those who see not littering or polluting as a civic responsibility average 10 years of age older than those who do not see these as civic responsibilities.

Water conservation is seen as more of a civic responsibility than voting by:

- Ages 18-44 (49 percent) versus ages 45 or more (29 percent).
- Renters (47 percent) more than owners (31 percent).
- Those who do not pay for their own water (45 percent) versus those who do (33 percent).

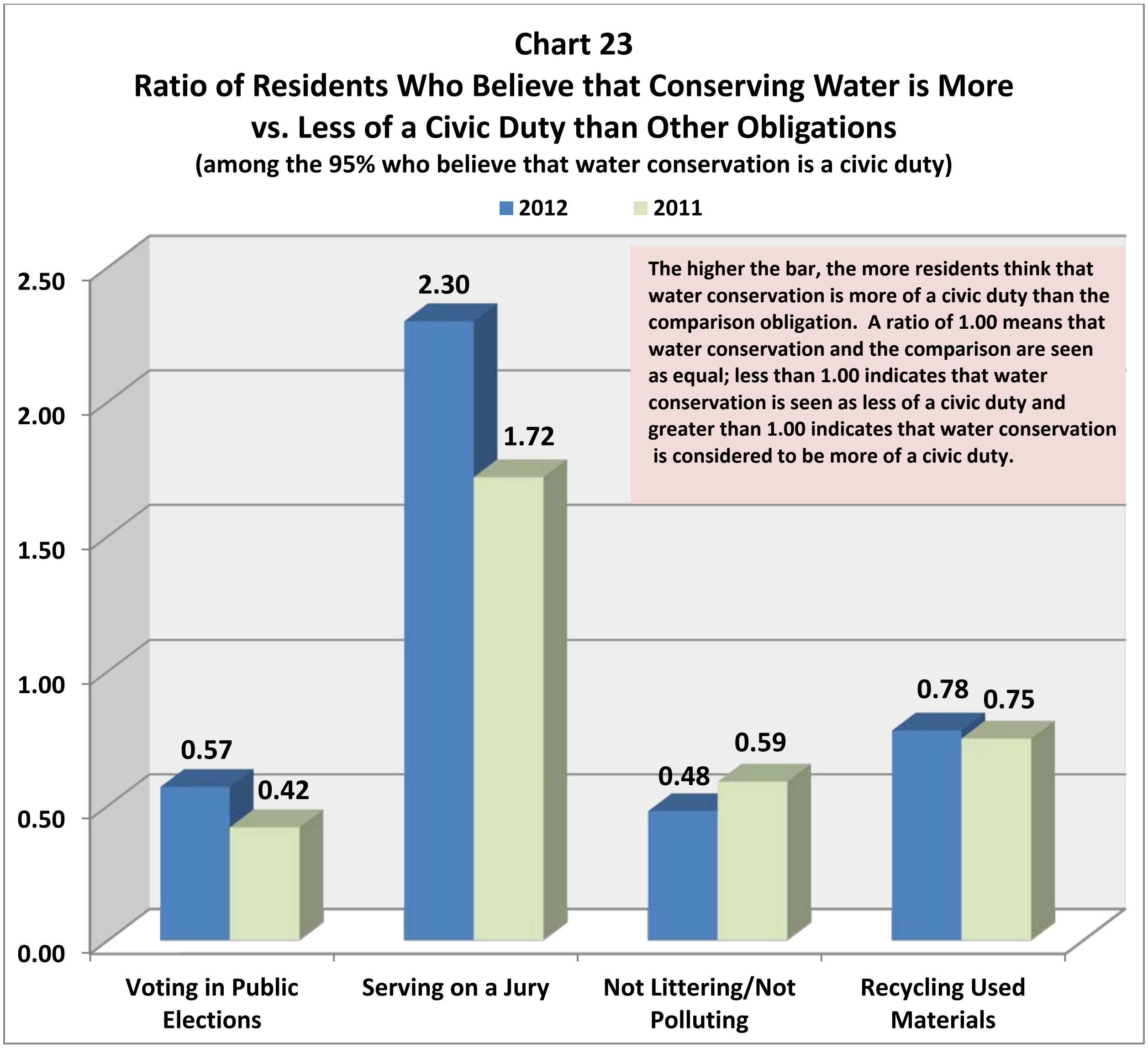
Chart 23 demonstrates how respondents feel about water conservation compared to other civic obligations. The comparison between water conservation and each of the other civic obligations is measured in terms of a ratio that measures those who feel that water conservation is more of a responsibility than these other civic obligations versus those who feel that water conservation is less of a civic responsibility. A ratio of 1.00 means that water conservation and the obligation with which it is being compared are equal in terms of how respondents perceive their civic responsibilities. A ratio of less than 1.00 indicates that water conservation is viewed as less of a civic responsibility than the comparison obligation and a ratio of greater than 1.00 means that water conservation is considered to be more of a civic duty that the obligation with which it is compared. In the current survey period as well in 2011, respondents regard water conservation as a greater civic responsibility than serving on a jury. In the current survey as well as in 2011, water conservation is closer to the same level as recycling used materials in terms of perceived civic responsibilities. Voting in public elections and not littering/not polluting are strongly regarded as higher civic obligations than water conservation.

Water conservation is seen as more of a civic responsibility than jury duty by:

- Ages 18-44 (81 percent) versus ages 45 or more (62 percent).

Water conservation is also seen as more of a civic responsibility than not littering or polluting by:

- Those who earn more than $50,000 annually (39 percent) versus those who earn less than $50,000 (18 percent).
- Those who pay their own water bills (37 percent) versus those who do not (25 percent).



Opinions about the Use of Recycled Water

SUMMARY: Over 7 in 10 respondents believe that it is possible to further treat recycled water that has been used for irrigation to make the water pure and safe for drinking. This represents a slight increase over the 2011 survey finding where two-thirds felt that it is possible to further treat recycled water for drinking purposes.

Nearly three-fifths of the respondents (56 percent) believe that drinking water already contains recycled water. This reflects a clear upward movement in the percentage of those who hold this belief – 47 percent in 2011. Three primary reasons are provided to explain why they feel this way. Respondents think that they hear from news stories that water is recycled, they "just know it" (includes hunches and common sense) and water tastes and smells bad.

Nearly three-fourths (73 percent) of the respondents either strongly favor or somewhat favor advanced treated recycled water as an addition to the supply of drinking water. This represents a slight increase in support for advanced treatment over the 2011 survey where 68 percent of the City respondents either strongly favored or somewhat favored advanced treated recycled water.

These findings show that approximately 70 percent of those who were originally not strongly in favor of using recycled water for drinking purposes would find it acceptable if recycled water received advanced treatment and if certain other safety measures were assured. This is an increase of about 20 percent over the approximately 50 percent who changed their mind in 2011.

Among the 20 percent who have heard about the Water Purification Demonstration Project, 6 percent know that it involves recycled water for drinking and household purposes – a decline of 5 percent from the 11 percent who correctly identified the purpose of the project in 2011. When respondents were informed about the Project, they expressed substantial support for the Project – over three-fourths either strongly favoring the project or somewhat favoring it. This level of support parallels the support indicated in the 2011 survey.

Chart 24 shows that over 7 in 10 respondents (71 percent) believe that it is possible to further treat recycled water used for irrigation to make the water pure and safe for drinking. This represents a slight increase over the 2011 survey finding where two-thirds (67 percent) felt that it is possible to further treat recycled water for drinking purposes.

Groups that view the possibility of making recycled water pure and safe for drinking differently from one another are:

- People who often or sometimes drink tap water are more optimistic than those who drink tap water less frequently. Those who drink tap water often or sometimes are 83 percent in belief that recycled water can be made pure and safe. Those who drink tap water rarely or never drink tap water are at 67 percent.
- Cell-phone only users are more positive (88 percent) than are land line telephone users (74 percent).

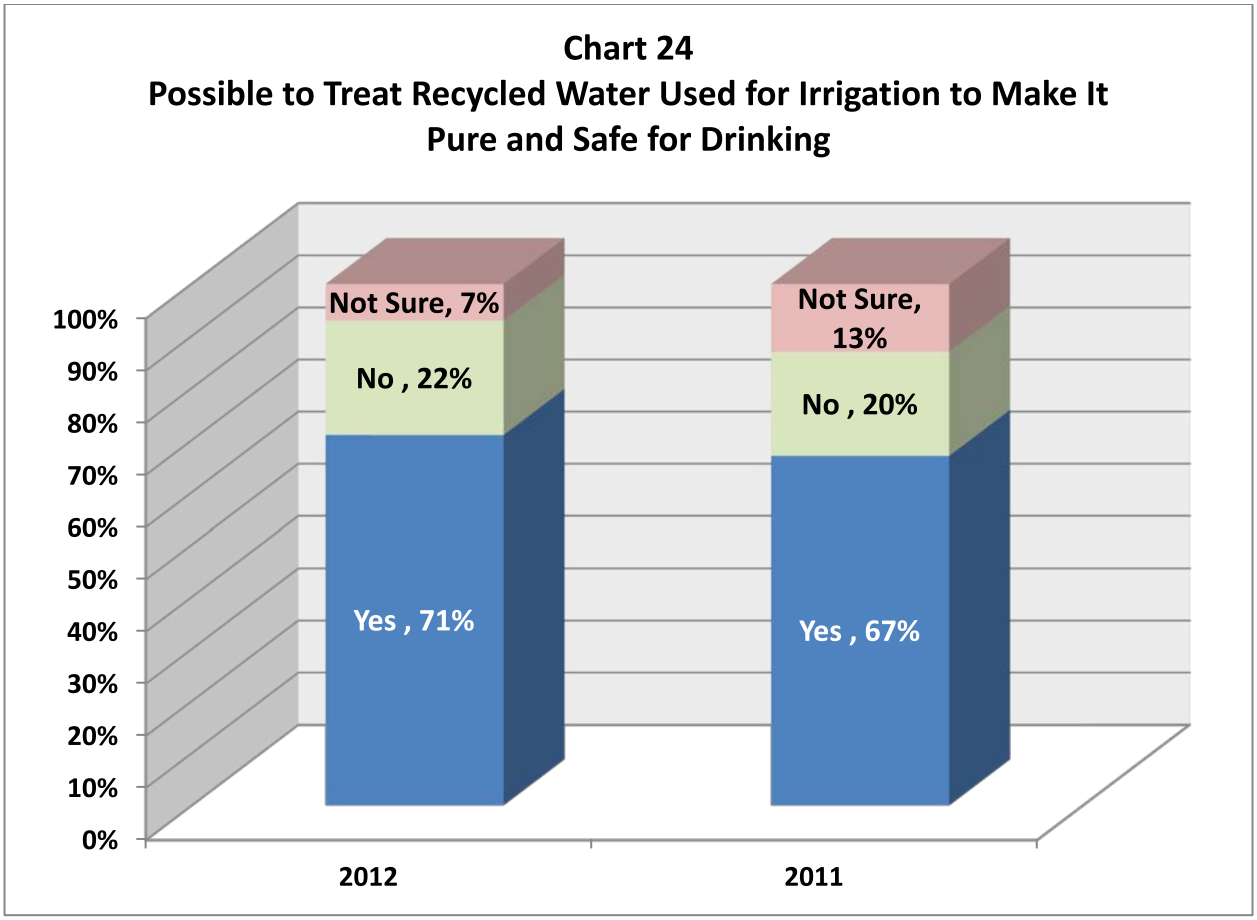
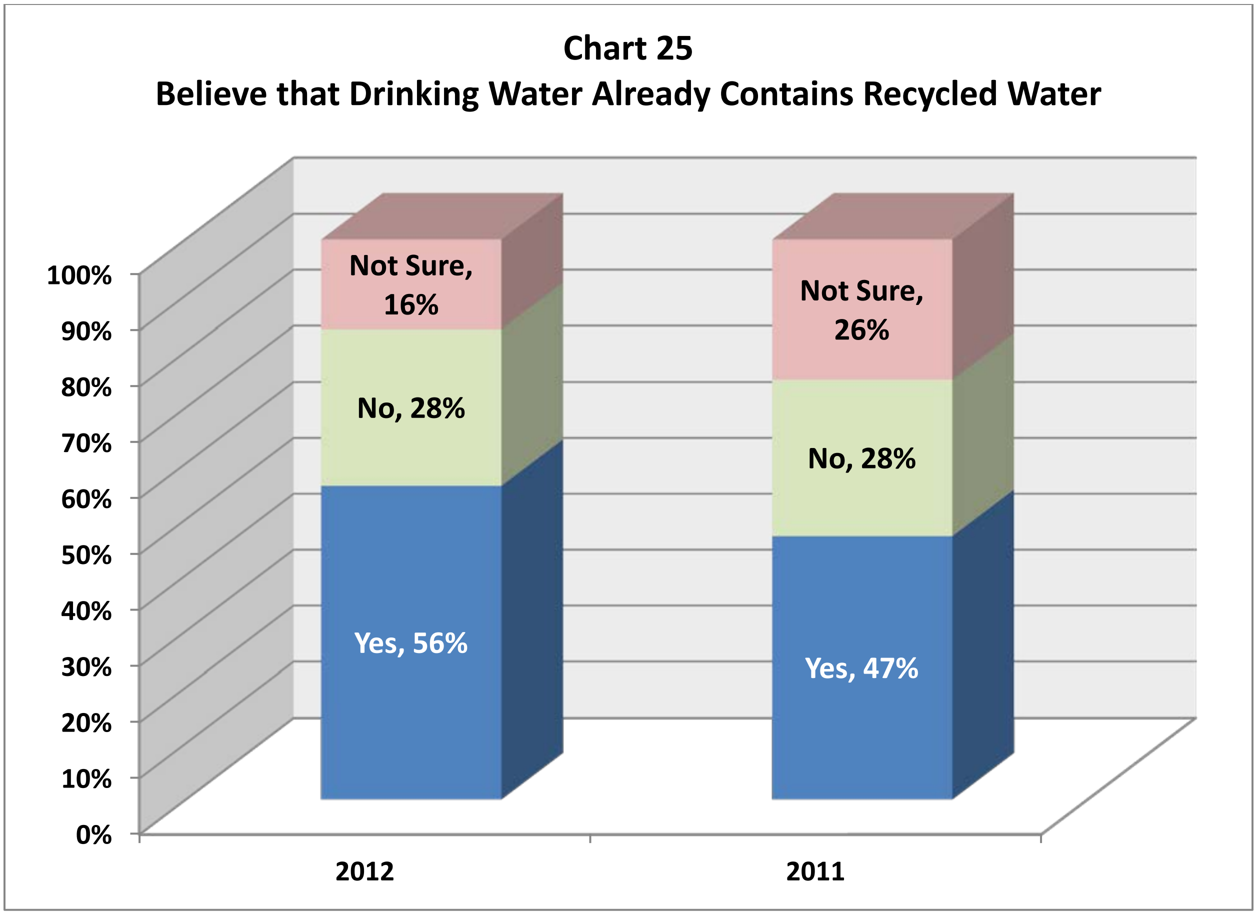


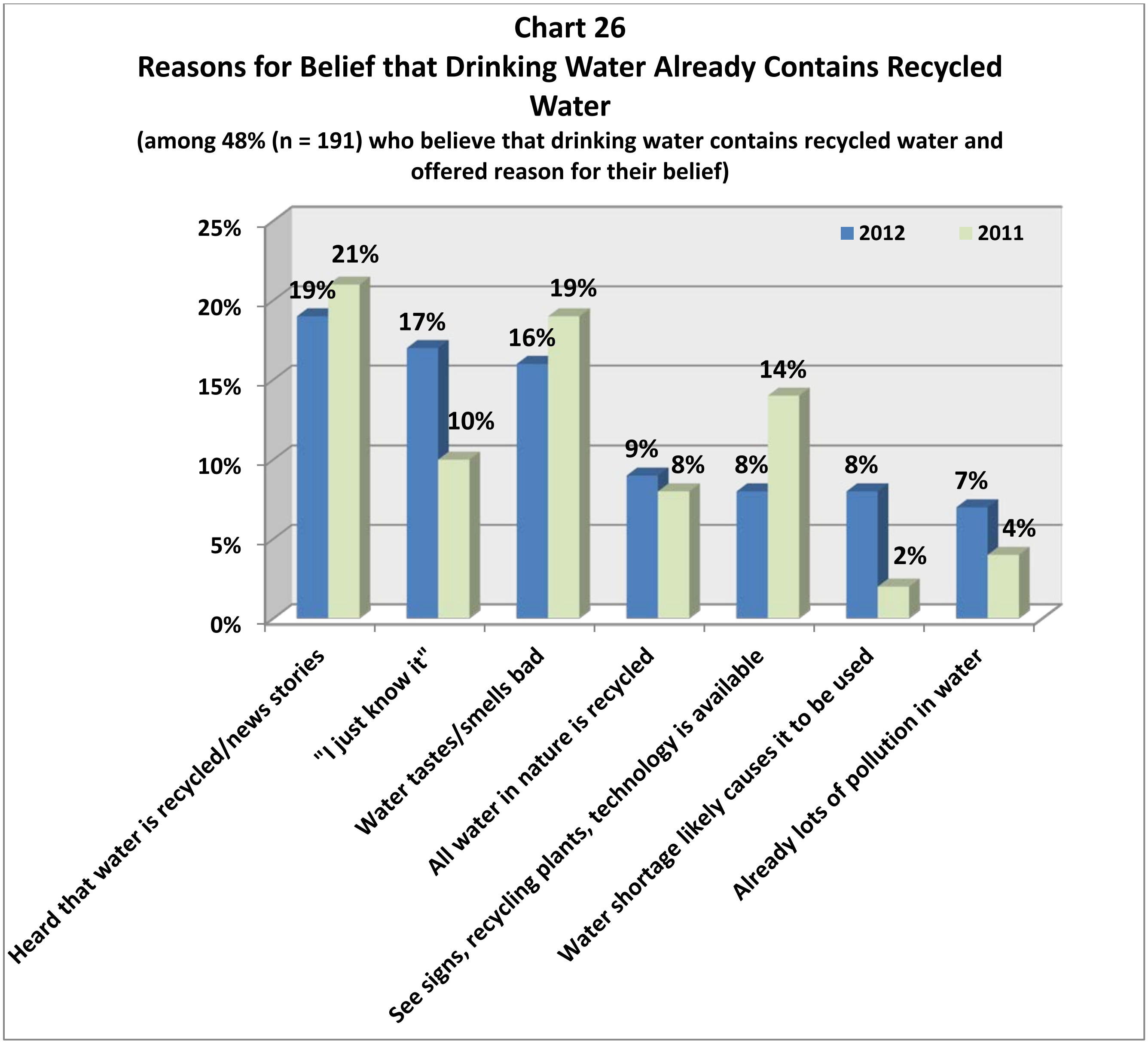
Chart 25 indicates that nearly three-fifths of the respondents (56 percent) believe that drinking water already contains recycled water. This reflects a clear upward movement in the percentage of those who hold this belief – 47 percent in 2011.

Several differences exist among groups related to their opinion as to whether or not drinking water already contains recycled water. The groups with the highest percentages indicating that drinking water already contains recycled water are as follows:

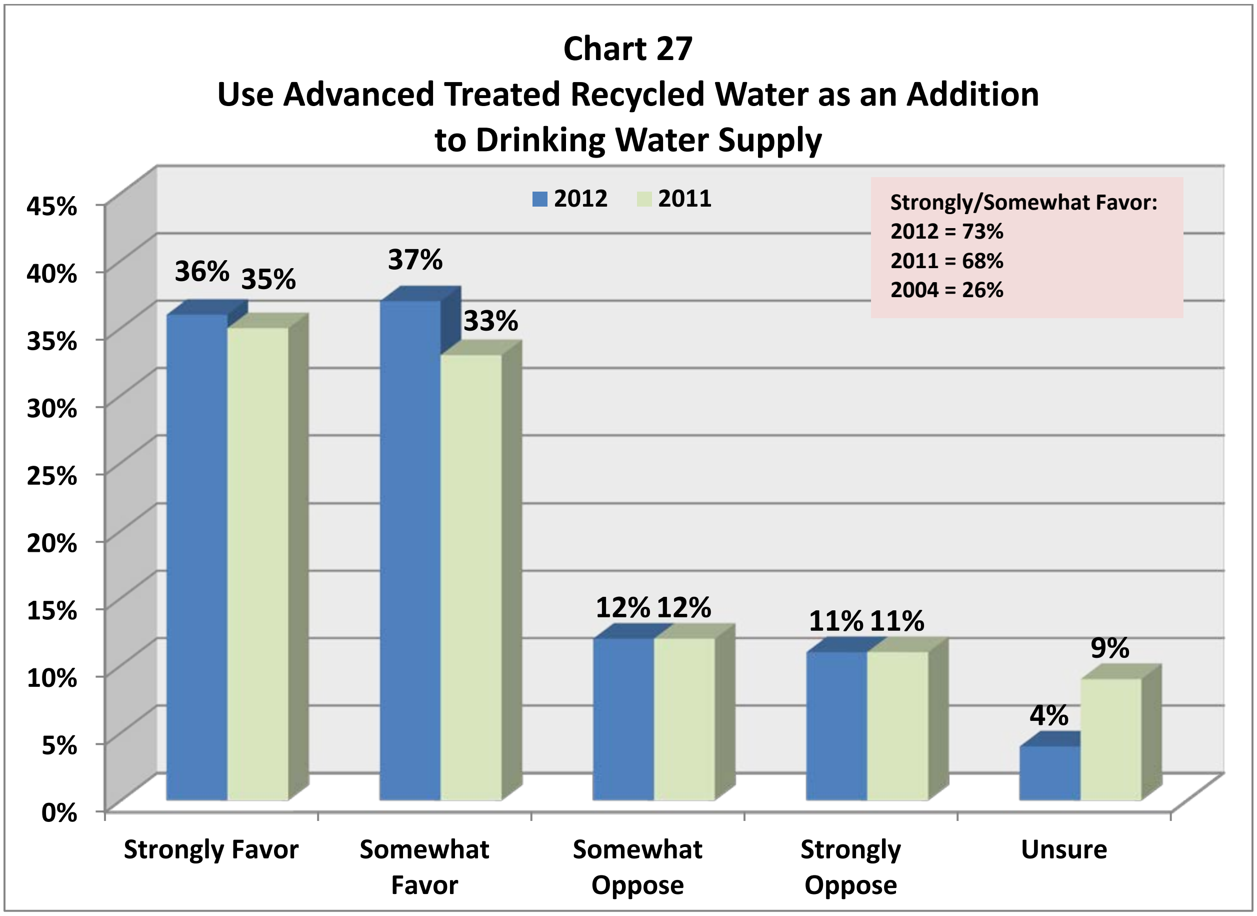
- Those who do not pay their own water bill (76 percent) versus those who do pay their own bill (63 percent).
- Renters (77 percent) versus homeowners (62 percent).
- Younger residents--ages 18-34 (79 percent) in contrast to 65 years of age or older (49 percent).
- Residents of San Diego County for 30 years or less (74 percent) versus residents of 31 years or more (57 percent).



Among the 56 percent of respondents who think that drinking water contains recycled water, three primary reasons are provided to explain why they feel this way. Respondents think that they hear from news stories that water is recycled (19 percent), they "just know it" (includes hunches and common sense) (17 percent), and water tastes and smells bad (16 percent). In 2011, hearing about recycled water from news stories was also the most dominant reason (21 percent). The reason "just know it" increased in importance by 7 percent from the 10 percent reported in 2011. The perception that the water tastes or smells bad and the indication that all water in nature is recycled are given similar importance in both survey years as reasons for believing that drinking water already contains recycled water. Thinking that they see recycling plants and available technology (14 percent) was a dominant reason in 2011 but a much less important reason in 2012 (8 percent). The reasons associated with water shortages and water pollution have grown in importance since the 2011 survey (**Chart 26**).



Respondents were asked whether or not they would favor using advanced treated recycled water as an addition to the supply of drinking water and that such advanced techniques include ultra-filtration, reverse osmosis, and advanced oxidation. (upon request, one of these three advanced techniques would be explained to the respondent, but only 10 respondents asked). **Chart 27** indicates that nearly three-fourths (73 percent) of the respondents either strongly favor (36 percent) or somewhat favor (37 percent) advanced treated recycled water as an addition to the supply of drinking water. It is important to note that this represents a slight increase in support for advanced treatment over the 2011 survey where 68 percent of the City respondents either strongly favored or somewhat favored advanced treated recycled water. It is particularly noteworthy that interest in using such advanced techniques has increased substantially since the 2004 survey when only 26 percent either strongly favored or somewhat favored such advanced treatment of recycled water.

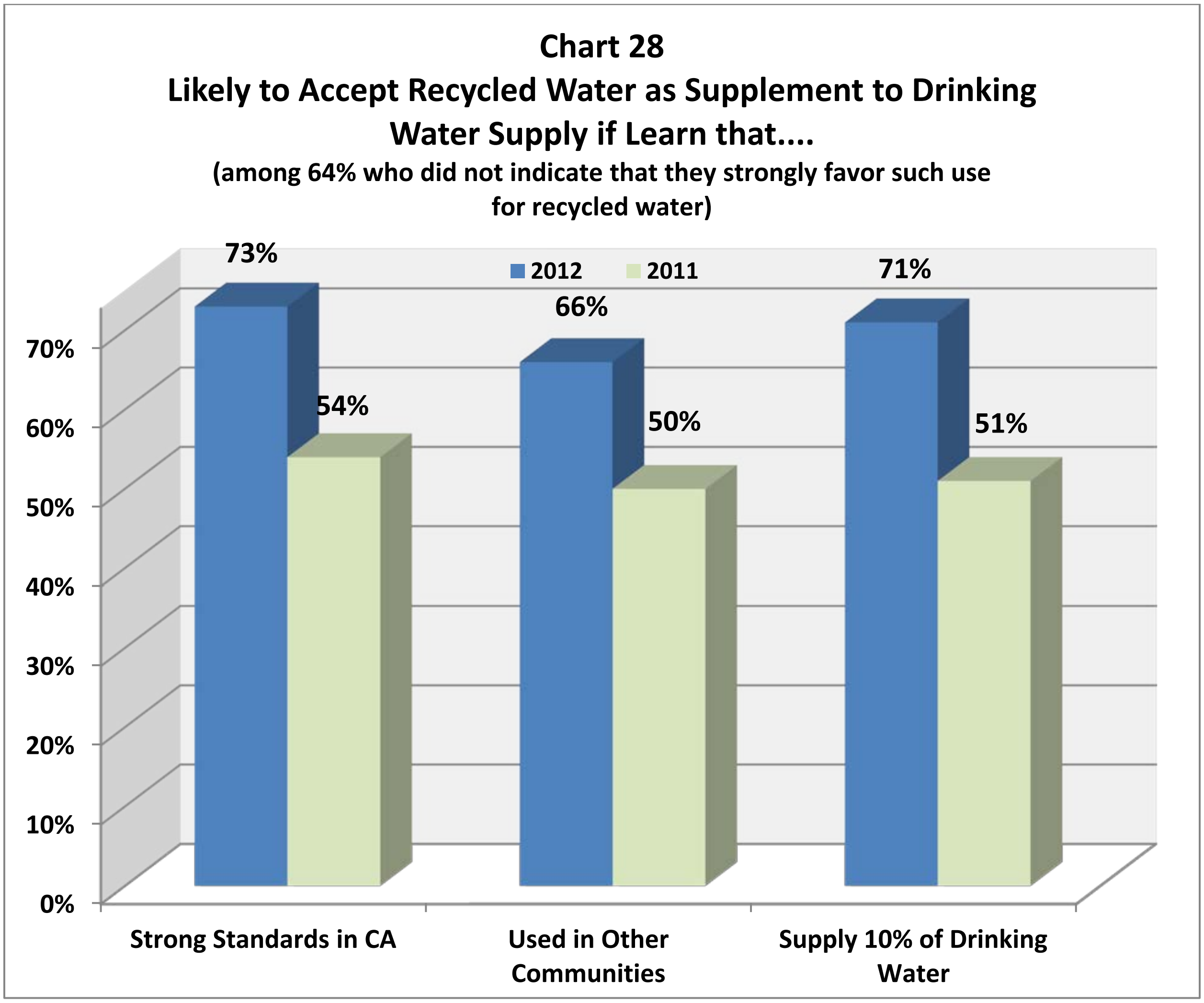


More strongly in favor of supplementing drinking water supplies with advanced treated recycled water are:

- Asians (68 percent strongly favor) versus all other groups—Blacks/African-Americans (49 percent, Whites (35 percent) and Hispanics/Latinos (30 percent).
- Drinkers of regular tap water often, sometimes or rarely (40 percent) versus those who never drink tap water (29 percent).

Respondents who did not already **strongly favor** the use of recycled water as an addition to the drinking water supply were asked if they would accept recycled water for drinking purposes if it were subject to such advanced treatment and if they learned certain facts about recycled water (**Chart 28).** The percentages reflect only those customers who formerly did not strongly favor the use of recycled water as an addition to the drinking supply but who changed their minds upon learning that:

- California drinking water standards are very strict and recycled drinking water would exceed those standards (73 percent). This represents a substantial increase from the results of the 2011 survey where an affirmative response of 56 percent was recorded.
- Recycled drinking water is used in other U.S. communities (66 percent); again, this represents a substantial (16 percent) increase over the 2011 survey result.
- Recycled drinking water could supply up to 10 percent of local supply (71 percent)--only 51 percent were influenced by this statement in 2011.



These findings show that approximately 70 percent of those who were originally not strongly in favor of using recycled water for drinking purposes, would find it acceptable if recycled water received advanced treatment and if certain other safety measures were assured. This is an increase of about 20 percent over the approximately 50 percent who changed their mind in 2011.

The message about California's strict drinking water standards carries more weight with the following groups:

- Higher income residents (mean income for those who are now more likely to support recycled water as an addition to drinking water is $87,400 versus those who are not similarly influenced -- $56,700).
- Larger households of 3 or more persons (80 percent) versus 1-2 person households (66 percent).
- Single family dwellers (76 percent) as opposed to those who live in apartments (61 percent).

The message about the use of recycled water in other U.S. communities is influential to

- Those who earn $75,000 or more annually (83 percent) versus those who earn less than $75,000 (62 percent).

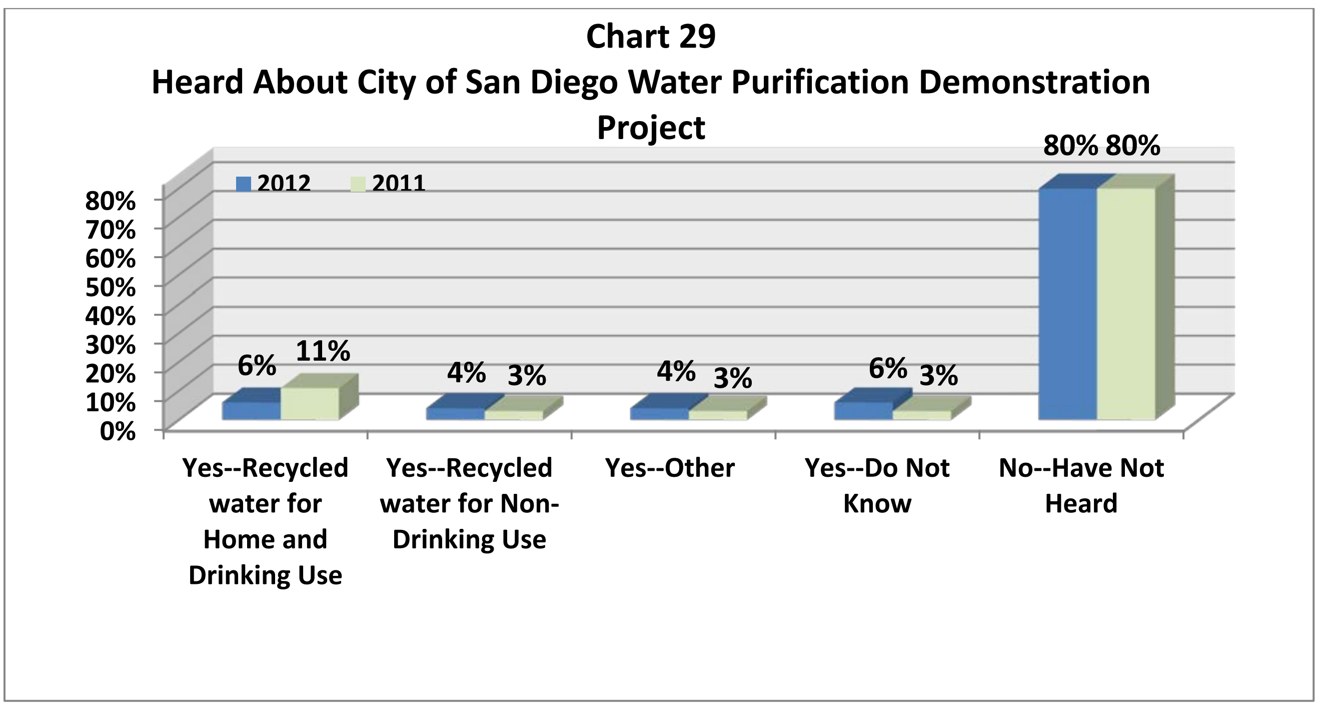
The message about the use of recycled water to supply 10 percent of our drinking water supply is influential to

- Those who often, sometimes or rarely drink regular tap water (77 percent) versus those who never drink regular tap water (61 percent).
- Residents of San Diego County for 10 years or less (85 percent) versus those who have resided in the County for 11 or more years (69 percent).

Table 2 shows that movement toward being more in favor of the use of recycled water for drinking water purposes differs, as would be expected, depending upon the degree to which the respondent was initially opposed or in favor of using recycled water for this purpose in the first place. Omitting all of those who were strongly in favor to begin with, it can be seen that the more in favor a respondent was initially, the easier it is for this information to sway his or her opinion. Among those who were previously somewhat in favor of recycled water being added to the drinking water supply, 83-to-90 percent are influenced by this information to be more in favor of this use of recycled water -- a stronger response than in 2011 where 65-to-72 percent shifted their opinion. In the current survey, 58-to-75 percent of those who are somewhat opposed can be positively influenced to accept recycled water for drinking purposes – again a stronger response than found in 2011 (38-to-50 percent).

Table 2 Shift in Opinion Using Recycled Water (Percentages Represent Respondents Now Likely to Accept Recycled Water for Drinking Water Purposes)				
	Formerly Somewhat in Favor	**Formerly Somewhat Opposed**	**Formerly Strongly Opposed**	**Don't Know/ Unsure**
California drinking water standards are very strict and recycled drinking water would exceed those standards	**89%**	**75%**	**12%**	**78%**
Recycled drinking water is used in other U.S. communities	**83%**	**58%**	**12%**	**72%**
Recycled drinking water could supply up to 10 percent of local supply	**90%**	**60%**	**12%**	**78%**

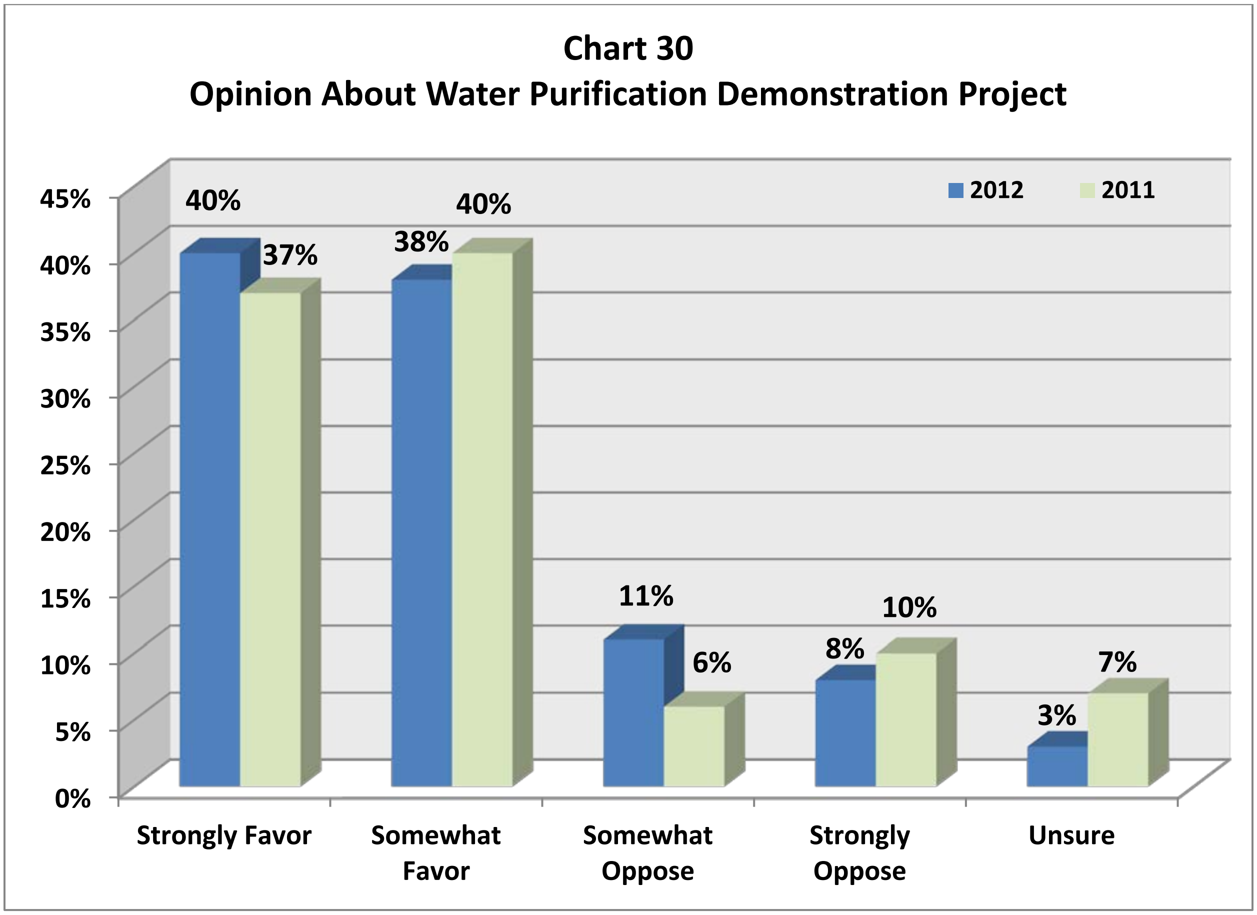
City of San Diego Water Purification Demonstration Project: Chart 29 shows that 80 percent of San Diego City residents have not heard of the City of San Diego Water Purification Demonstration Project. This is precisely consistent with the results of the 2011 survey. In the current survey, among the 20 percent who have heard about this project, 6 percent know that it involves recycled water for drinking and household purposes – a decline of 5 percent from the 11 percent who correctly identified the purpose of the project in 2011. In 2012, 4 percent believe that the project involves recycled water for a purpose other than household and drinking use and this is consistent with the 3 percent who believed this in 2011.



Knowledge of the Water Purification Demonstration Project is highest among:

- Ages 55 and older (32 percent) versus those 54 years of age and younger (13 percent).
- Land line telephone users (23 percent) versus those who use only cell phones (10 percent).

Respondents were subsequently informed about the nature and purpose of the Water Purification Demonstration Project. When so informed, residents expressed substantial support for the Project. **Chart 30** shows that 78 percent of residents either strongly favor (40 percent) or somewhat favor (38 percent) the goals of the Project. This response represents strong approval for the use of recycled water for drinking purposes and precisely parallels the high level of support in 2011 for the Water Purification Demonstration Project.



Groups that strongly or somewhat favor the Water Purification Demonstration Project are:

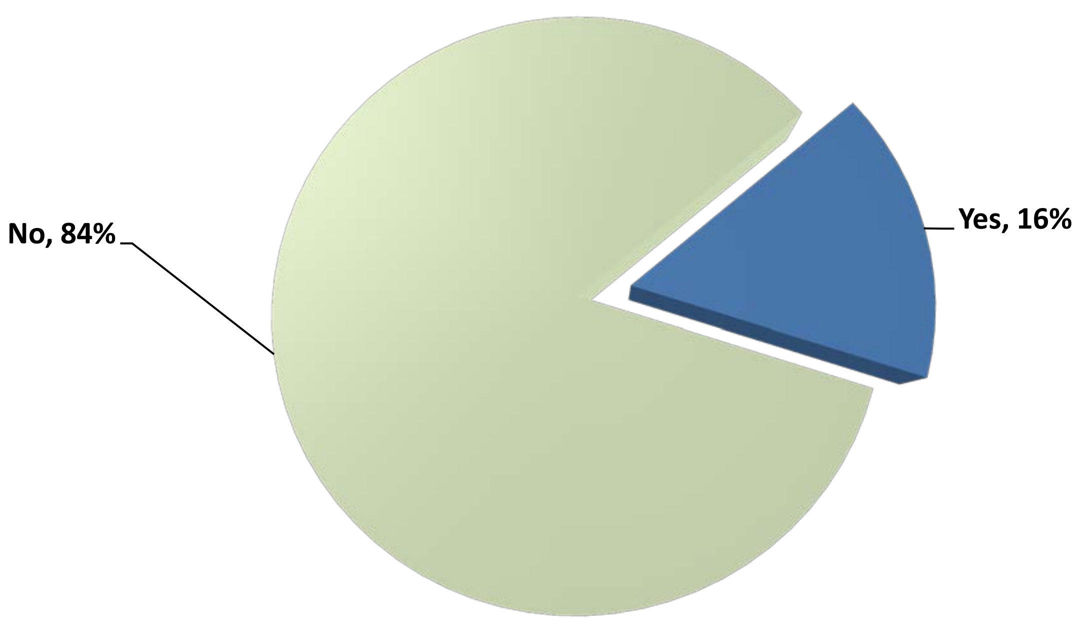
- Asians (58 percent) versus Blacks/African-Americans (23 percent). Whites (44 percent) and Hispanics/Latinos (38 percent) are close to the overall average percentage.

- Those who often or sometimes drink tap water (84 percent) versus those who rarely or never drink tap water (75 percent).

Chart 31 shows that 16 percent of the City of San Diego respondents are aware that Orange County has used the same water purification process as the City of San Diego's Water Purification Demonstration Project for many years.

- Awareness that Orange County has used the same water purification process for several years is highest among those who often, sometimes or rarely drink tap water (18 percent) in contrast to those who never drink tap water (9 percent).

Chart 31
Aware that Orange County Has Used Same Water Purification Process as Water Purification Demonstration Project for Many Years?



Water Rates

Over two-fifths (45 percent) of respondents feel that the cost of water is too expensive. This represents a decline from the 2011 survey period among those who feel the cost of water is too expensive -- in 2011, 52 percent indicated water was too expensive. This result points to a trend toward an enhanced understanding of and tolerance for the cost of water. The dominant causes for increases in water rates are seen by residents as more water being consumed by customers and less rain in San Diego—neither of which is correct.

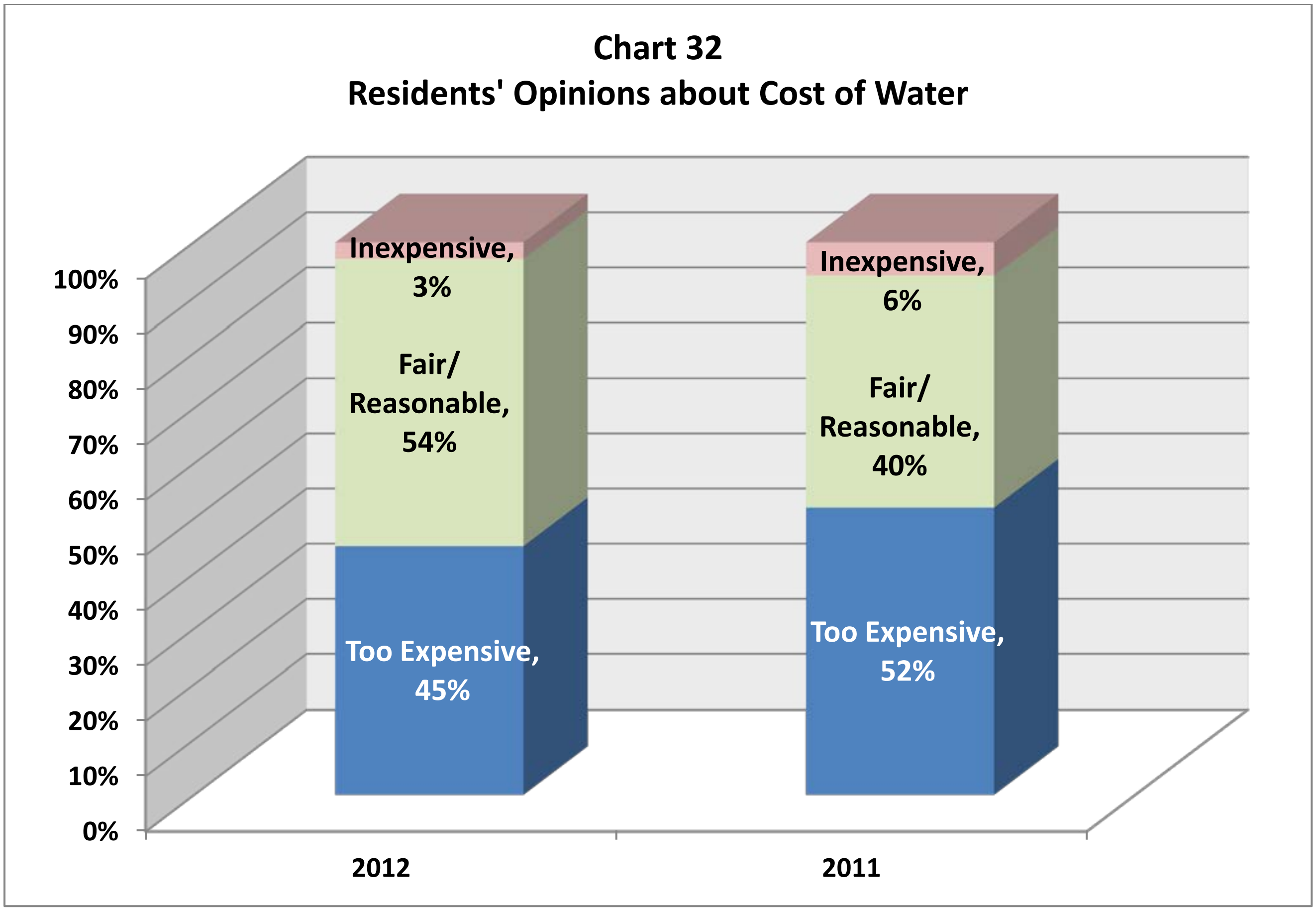
Over three-fifths of respondents feel that increases in water rates are necessary to maintain reliability of the water supply while one-third of the respondents feel that increased water rates are not necessary and should be stopped. This represents a distinct shift from the 2011 survey results toward an understanding and a tolerance of water rate increases. In the 2011 survey, there was a near equal split in opinion about the necessity of water rate increases to pay for projects designed to improve water supply reliability.

However, despite this seeming acceptance of water rates, almost two-thirds indicated that they were very concerned or somewhat concerned about continued increases in these rates. This level of concern is consistent with the results of the 2011 survey.

Chart 32 demonstrates that, despite its high degree of valuation discussed earlier in this report, over two-fifths (45 percent) of respondents feel that the cost of water is too expensive. This represents a decline from the 2011 survey period among those who feel the cost of water is too expensive -- in 2011, 52 percent indicated water was too expensive. In the current survey, another 54 percent feel that the cost is fair and reasonable. This represents a 14 percent increase from 2011 to 2012 regarding those who feel that the cost of water is fair and reasonable. There is a clear trend toward an understanding of and/or a tolerance of the cost of water.

The following groups are more likely to feel that the cost of water is too expensive:

- Residents who have lived in the County for 10 years or more (48 percent) as opposed to those who have been in the County for less than 10 years (32 percent).
- Homeowners (47 percent) as opposed to renters (40 percent).
- Residents with a lower income – residents who earn less than $75,000 feel that the cost of water is too expensive (46 percent) versus those who earn $100,000 or more (34 percent).
- Those who drink bottled water often (52 percent) versus those who never drink bottled water (25 percent).
- In the reverse, those who never drink tap water find water to be more expensive (58 percent) than do those who drink tap water often, sometimes or rarely (40 percent).



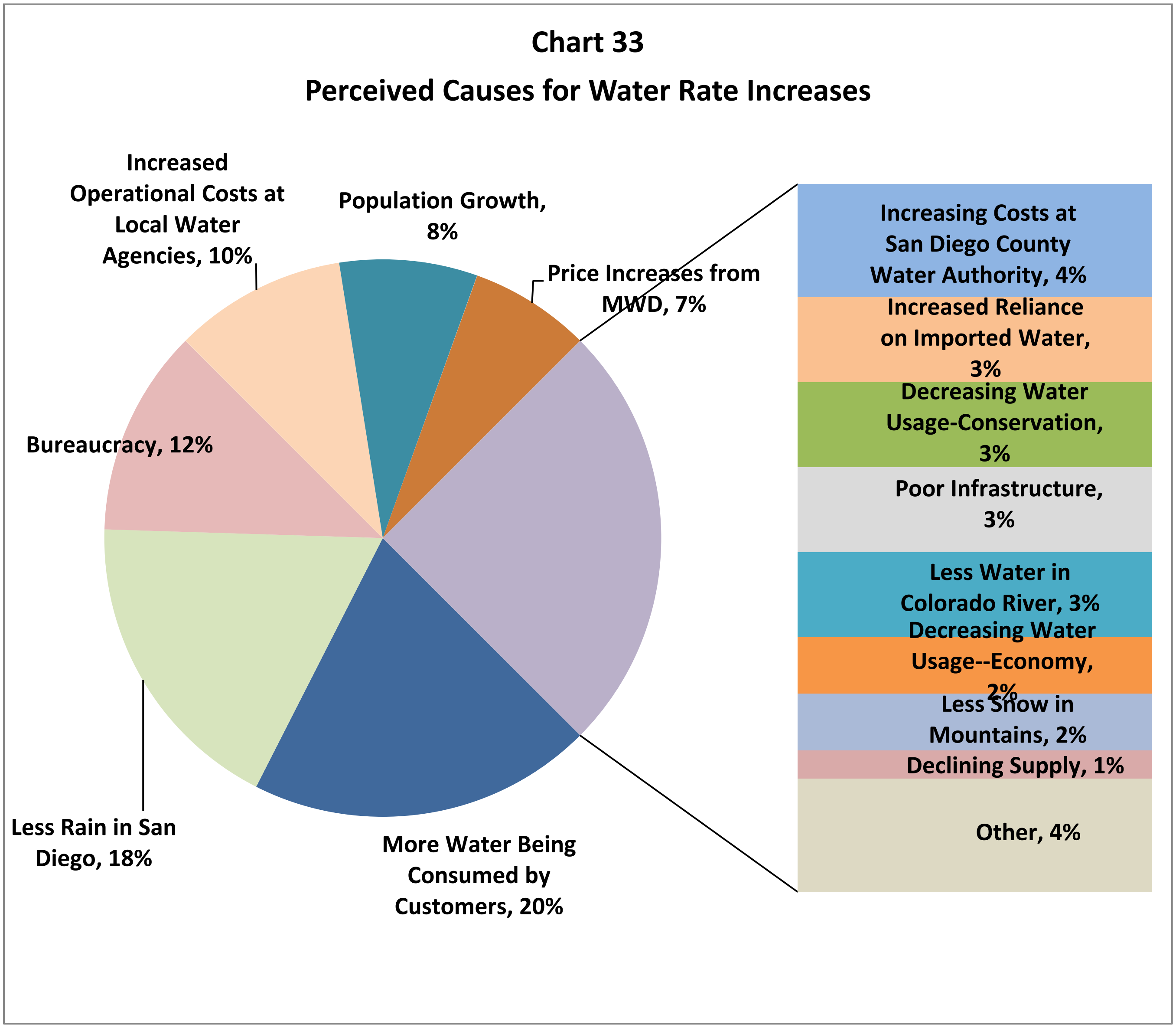
The perceived causes for water rate increases are shown in **Chart 33**. The dominant causes in the view of the respondents are more water being consumed by customers (20 percent) and less rain in San Diego (18 percent)—neither of which are correct as primary causes. Bureaucracy (12 percent) and increased operational costs at local water agencies (10 percent) follow in the order of importance.

There are significant differences among groups regarding the biggest causes of water rate increases:

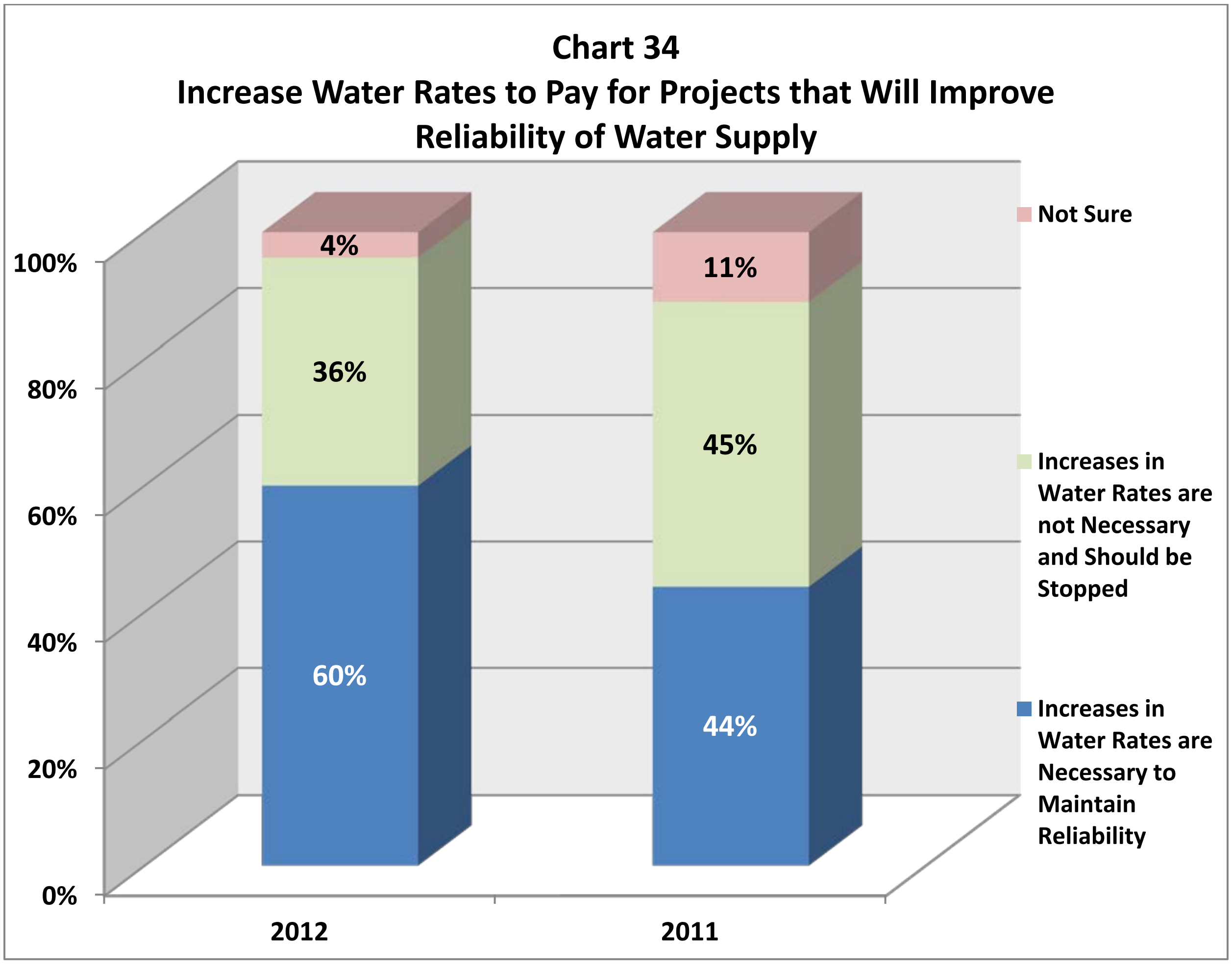
- Homeowners and Renters differ on the following perceived causes:
  - Bureaucracy (owners 17 percent—renters 9 percent)
  - Increased operating costs at local water agencies (owners 11 percent—renters 5 percent).
  - Price increases from MWD (owners 9 percent—renters 3 percent)
  - More water being used by customers (renters 25 percent—owners 18 percent)
  - Population growth (renters 11 percent—owners 6 percent)
  - Decreased usage due to conservation (renters 7 percent—owners 2 percent)
- Older residents consider the following as bigger causes of water rate increases:
  - Increased costs at San Diego County Water Authority (61 years of age)
  - Price increases from MWD (59 years of age)

- Bureaucracy (57 years of age)
- Less water in Colorado River (55 years of age)
- Reliance on imported water (54 years of age)

- Younger residents consider the following as bigger causes of water rate increases:
    - Economy (41 years of age)
    - More water used by customers (44 years of age)
    - Low/Declining water supply (47 years of age)
    - Less water used because of conservation (47 years of age)
    - Less rain in San Diego (48 years of age)



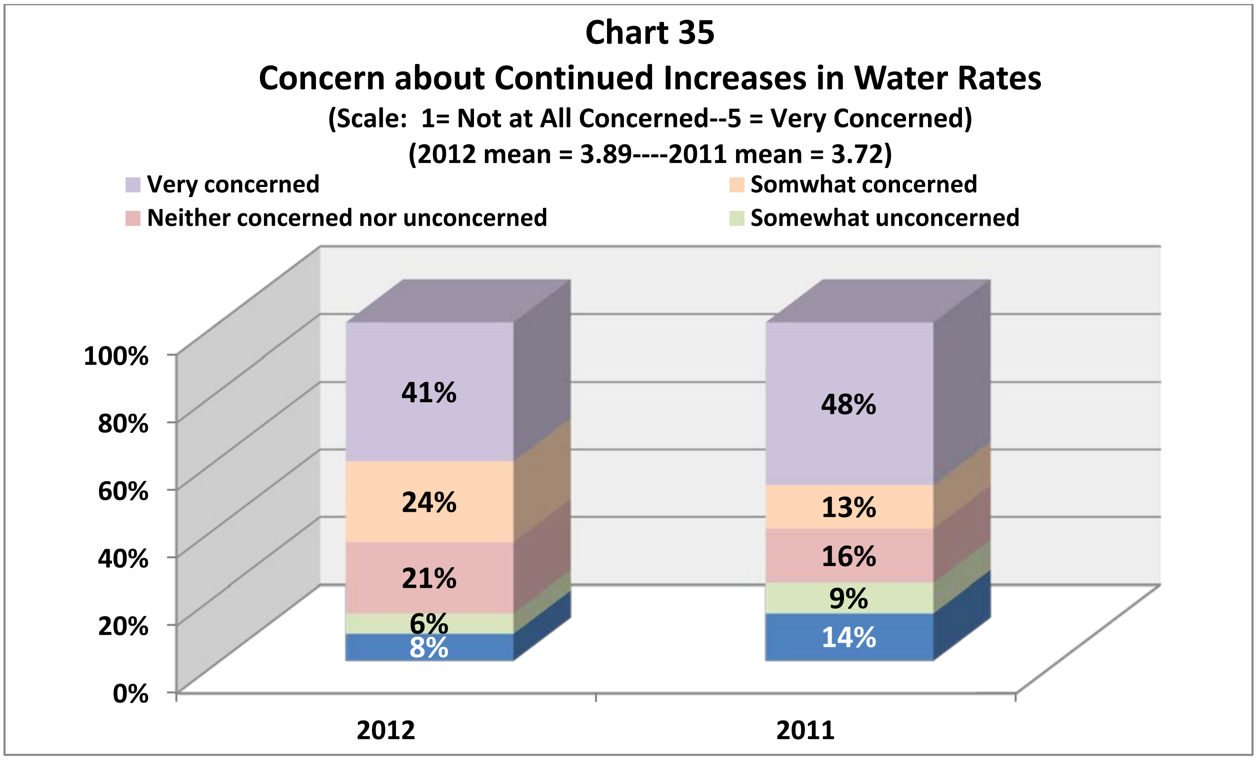
Two hypothetical arguments were put forth about whether or not increased water rates are necessary to maintain an adequate water supply. One argument was that "Mr. Smith says that increases in water rates are necessary to maintain reliability of the water supply" and the other was that "Ms. Jones says that increasing water rates are not necessary and should be stopped." Three-fifths of respondents (60 percent) feel that increases in water rates are necessary to maintain reliability of the water supply (Mr. Smith's argument) while well over one-third of the respondents (36 percent) feel that increased water rates are not necessary and should be stopped (Ms. Jones' argument) (**Chart 34**). This represents a distinct shift from the 2011 survey results and again reaffirms the trend that the population is expressing a greater tolerance for and acceptance of water rate increases. In the 2011 survey, the there was a near equal split in opinion about the necessity of water rate increases to pay for projects designed to improve water supply reliability.



The following groups are more likely to think that water rate increases are necessary to maintain the reliability of the water supply:

- Shorter term residents of the County (less than 10 years – 78 percent versus 10 years or more – 57 percent).
- Residents with incomes of $75,000 or more (72 percent) versus those with incomes below $75,000 (56 percent)
- Residents with at least one year of post-graduate education (74 percent) in contrast to college degree or less (59 percent)
- Those who often, sometimes or rarely drink tap water (68 percent) versus those who never drink tap water (46 percent)

Chart 35 reports the level of resident concern regarding the prospect of continued increases in water rates. This concern was measured on a 5-point scale, where 1 = not at all concerned to 5 = very concerned. Three fifths (65 percent) recorded ratings of very concerned (41 percent) and somewhat concerned (24 percent) despite their seeming acceptance of higher rates. The mean rating is 3.9, which represents a high level of concern. This level of concern is consistent with the results of the 2011 survey where 61 percent were either very concerned or somewhat concerned about continued increases in water rates and where the mean rating was 3.7.



The following groups are either very concerned or somewhat concerned about increases in water rates:

- Homeowners (71 percent) versus renters (51 percent).
- Residents of single family homes (73 percent) versus those who are apartment dwellers (35 percent).
- Longer term residents of 31 years or more exhibit the greatest level of concern about increases in water rates (very or somewhat concerned = 73 percent versus 30 years or less = 59 percent).
- Households that pay for their water (71 percent) versus households that do not pay for water (51 percent).

2010 San Diego State University Research Study
Executive Summary

Executive Summary

Water Purification Demonstration Project: A Community Study

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Community-Based Service Learning Project

Every semester at San Diego State University, students enrolled in Journalism 581, Public Relations Research Methods, conduct a community-based service learning project for organizations on the SDSU campus or a non-corporate client in the larger community. The purpose of community-based service learning projects is to provide students with hands-on experience conducting a full-scale research project while providing a product of benefit to the sponsoring organization. The sponsoring client provides a stipend through the SDSU Research Foundation to provide logistical and material support for the project. Past clients have included Birch Aquarium, Scripps Healthcare, the San Diego County Water Authority, and Sharp Mesa Vista. These projects have been conducted for 30 years.

The Community Study

The City of San Diego Public Utilities Department contacted SDSU to see if the Water Purification Demonstration Project would serve as a useful focus for a community-based service learning project for the public relations research methods course. After discussing the parameters of the study, it was agreed in July, 2010 that the Water Purification Demonstration Project would serve as a useful focus for the class project.

Research Questions and Information Needs

In discussions with the Community Outreach Specialist of the Public Utilities Department, a number of research questions and information needs were identified. How much do San Diegans know about the water supply for the city? Do San Diegans know how much of our potable water is imported from outside the county? What do San Diegans know about water purification in general and about the Water Purification Demonstration Project specifically? What is the relationship between knowledge about water purification and opinions about the Water Purification Demonstration Project? How do demographics (e.g., age, income, ethnicity, and gender) influence what San Diegans know and how they feel about water purification.

Research Methodology

One goal of the course is to show students how to combine qualitative research methods (e.g., focus groups, depth interviews, participant observation) with quantitative research methods (e.g., telephone and online surveys) to provide better information to client organizations. Therefore, students conducted face-to-face depth interviews with a dimensional sampling of San Diegans, as well as telephone interviews with San Diegans, using random digit dialing (RDD). RDD ensures that both listed and unlisted numbers are included in the sample.

Methods: Depth Interviews

In the fall semester, 2010, 63 students were enrolled in the public relations research methods course. This included 52 undergraduates and 11 graduate students. The class was divided into 11 self-selected "consulting groups." Each consulting group constructed a depth interview guide (DIG), which is a series of semi-structured open-ended probes similar to the probes used in focus group studies. The instructor reviewed and edited each DIG. Student consulting groups then used the edited version of the DIG to conduct 45- to 60-minute face-to-face interviews with San Diegans. Each DIG was unique to the consulting group that developed it. However, all DIGs focused on a set of information needs articulated by the client organization. These included: (1) to determine awareness of the need to develop local, reliable water sources, (2) to determine awareness of the Water Purification Demonstration Project, (3) to determine the level of understanding of the advanced purification process (3-step process), (4) to determine the level of awareness of the fact that San Diego's regular drinking water supply already contains recycled water, (5) to learn about the concerns that San Diegans have about using purified recycled water (which might include safety or quality), (6) to learn about attitudes towards the addition of purified recycled water to local reservoirs if a full-scale project of reservoir augmentation were to be approved by the city council, and (7) to explore the linkage between knowledge and opinions about water purification.

Findings: Depth Interviews

From the 63 depth interviews conducted in October, 2010, the following tentative results emerged. First, San Diegans are woefully uninformed about sources of potable water in the City of San Diego and increasing limitations on imported water supplies.

Second, San Diegans were quite unfamiliar with the terminology that "insiders" (e.g., Public Utilities Department) use to discuss water quality and supply. One participant, for example, defined *potable water* as water one uses to water household plants. More complex terminology, such as reverse osmosis, microfiltration, ultraviolet treatment, and peroxide treatment, was not comprehensible for the vast majority of people interviewed. Very few of the depth interview participants had heard anything about the Water Purification Demonstration Project. Third, a number of participants said that they disliked the taste of tap water in San Diego, including people who had never actually consumed San Diego tap water. This information was used by the research consulting groups to develop drafts of telephone questionnaires, based on revised information needs provided by the client organization.

Methods: Telephone Survey

Based on the information gleaned from the depth interviews, 11 draft questionnaires were prepared by the student consulting groups. The professor reviewed the questionnaires generated by the students and constructed a master questionnaire from student input. The master questionnaire (length=10 minutes) was then vetted to the client organization and revised. Graduate students in the class then conducted a pilot test of the questionnaire. Minor technical problems with flow and vocabulary were identified during the pilot test. These problems were corrected and the questionnaire was duplicated on paper. The questionnaire was also converted to a Web-based questionnaire (using Survey Monkey, a commercial online survey vendor). A list of random digit telephone numbers for the City of San Diego was purchased from Scientific Telephone Surveys, a vendor in Orange County. In November, 2010, students dialed 11,414 telephone numbers. To qualify, respondents were required to be (1) 18 or older and (2) residents of the City of San Diego. The questionnaire was also translated into Spanish and back translated to ensure accuracy. Students who were sufficiently bilingual were referred to households where an initial contact indicated that the residents were Spanish speaking only. After eliminating disconnects, business and government numbers, households with language barriers, and no answers after at three attempts, the original sample was reduced to a valid sample of 5,478. Of those, the response rate was 11%, the refusal rate was 22%, and the noncontact rate was 67%. A total of 626 eligible respondents were interviewed; the margin of error (95% confidence interval) is +/- 4 percentage points. The data was entered into an Excel database from Survey Monkey, which was used by students as an input tool. These data were then uploaded into a data file compatible with the Statistical Package for the Social Sciences (SPSS), Version 18 for Macintosh. In general, older people and women are more likely to respond to telephone interviews. Therefore, the professor weighted the data file to match the City of San Diego with regard to gender and age, based on known population distributions from the U.S. Bureau of the Census. Thus, the sample matches the population of San Diego with regard to age and gender.

Findings: Demographics From Telephone Survey

Regarding gender, the sample was 51% male; average age was 43.8 years (median=40.3 years). Average income was $96,880 (median=$75,000). Regarding education, fewer than 16% had earned a high school diploma or less. Another 31% had attended some college or earned a 2-year or technical degree. About 31% had earned a 4-year degree. Nearly 22% had attended graduate school or had earned an advanced degree. Regarding ethnicity, 62% reported that they were white/Caucasian, 18% indicated that they were Hispanic or Latino, 85 reported that they were Asian American and another 8% reported that they were African American. Only 2% reported that they were Native American and 1% reported that they were Hawaiian or Pacific islanders. Average length of residency was 24.8 years (median=21.0 years). About 83% were registered to vote. Democrats outnumbered Republicans 31% to 24%, with 15% reporting that they were independents. The balance of the sample was affiliated with minor parties, declined to answer the question, or were not registered to vote.

Findings: Awareness of WPDP

According to the survey, 78% of respondents had not heard of the Water Purification Demonstration Project (WPDP). Of those who had heard of the WPDP, 8% said that the WPDP had something to do with converting wastewater to drinking water. About 9% mentioned "toilet to tap" explicitly. The remaining 5% who said that they had heard of the WPDP said they could not recall what they had heard.

Findings: Opinions About the WPDP

Respondents were read a brief, 47-word description of the WPDP. Then they were asked their opinion of the Project, based on the description and/or any prior knowledge they had about it. About 63% of respondents said they favored the Project, either somewhat or strongly.

Findings: Linkage Between Knowledge and Opinion

Based on the depth interviews, the research class hypothesized that opinions of the WPDP might be linked to the level of knowledge about the Project: The more knowledgeable a San Diegan becomes about the Project, the more favorably they will view the Project. This is a basic theory of information processing, applied to a specific case. Respondents were read four brief information modules related to water purification. These information modules dealt with (1) the purity of water generated by the WPDP treatment process, (2) a brief description of the 3-step water purification process, (3) the utilization of similar technology in other communities (e.g., Orange County), and (4) the current utilization of recycled water in San Diego from communities upstream. Consistent with the class hypothesis, greater knowledge of water purification tended to correlate with more favorable views of water purification.

Trusted Sources of Information

From the depth interviews, the research class learned that a number of participants were distrustful of sources of information about water supply and especially water quality. One goal of the study was to determine the types of information sources that San Diegans trust with regard to water quality and safety. About 67% of respondents indicated that they would trust "a great deal" a "scientist who is a water quality expert." About 33% said they would trust a health department official "a great deal."

Stakeholder Interviews (Spring 2010-Spring 2011)

Water Purification Demonstration Project
Stakeholder Interviews (Spring 2010-Spring 2011)

Stakeholder Interviews Completed: 105

- American Consulting Council/
  Simon Wong Engineering
- American Society of Landscape Architects
- Asia Media, Inc.
- Asian Business Association
- Bayview Baptist Church
- Bethel Baptist Church
- Black American Political Action Committee
- Blacks in Government
- California Curl and Monitor (San Diego Monitor)
- Care View Medical Group
- Casa Familiar
- Catfish Club of San Diego
- Central Commercial District Revitalization Corp.
- Chicano Federation
- City Heights Community Planning Group
- Clean TECH San Diego
- Coalition of Neighborhood Councils
- El Latino Newspaper
- Fairmount Park Association
- Faith Chapel Church of God in Christ
- Filipino Press
- Filipino-American Chamber of Commerce
- Food and Beverage Association San Diego
- Fountain of Life Church of God in Christ
- General Dynamics NASSCO
- Geocon, Inc.
- Golden Hill Community Development Corp.
- Greater Skyline Hills Neighborhood Council
- Green Chamber of San Diego County
- Homefront San Diego
- House of Metamorphosis
- Jackie Robinson Family YMCA
- Jamacha Neighborhood Council
- Japan Society of San Diego & Tijuana
- Japanese American Citizens League
- Japanese Friendship Garden
- Kaiser of San Diego
- Korean Chamber of Commerce
- La Prensa Newspaper
- La Raza Lawyers
- Lao Community Culture Center
- Local Initiatives Support Corporation
- MAAC Project
- Mabuhay Alliance
- Macedonia Baptist Church
- MANA de San Diego
- Mt. Carmel Church
- Mt. Erie Baptist Church - Pastors on Point
- Mt. Zion Baptist Church
- Neighborhood House Association
- New Life Baptist Church
- New Paradise Baptist Church
- Nu-Way Christian Ministry
- Otay Mesa Chamber of Commerce
- Pilgrim Progressive Baptist Church
- Qualcomm
- Ridgeview Neighborhood Council
- San Diego and Imperial Counties Labor Council
- San Diego Asian Film Foundation
- San Diego Association of Realtors
- San Diego Building Industry Association
- San Diego Chinese Historical Museum
- San Diego Convention & Visitors Bureau (CONVIS)
- San Diego County Building
  and Construction Trades Council
- San Diego County Community College District
- San Diego County Farm Bureau
- San Diego County Hispanic Chamber of Commerce
- San Diego County Hotel-Motel Association
- San Diego County Medical Society
- San Diego County NAACP
- San Diego County Veterinary Medical Association
- San Diego Oceans Foundation

- San Diego PTA Unified Council
- San Diego Regional Economic Development Corp.
- San Diego State University
- San Diego Travel Association
- San Diego Unified School District
- San Diego Vietnamese Federation
- San Ysidro Business Association
- San Ysidro Chamber of Commerce
- San Ysidro Health Center
- Scripps Health
- Sempra Energy
- Sierra Club
- South Bay Community Services
- South County Economic Development Council
- Southeastern Economic Development Corp
- St Rita's Catholic Parish
- St. Charles Church
- St. Stephen's Church of God in Christ
- The Greater San Diego Business Association
- The Nature Conservancy
- The San Diego Foundation
- The San Diego Junior Chamber JAYCEES
- The Star News
- Tieng Nuoc Toi Radio, KSON 97.3
- Union of Pan Asian Communities
- United States Green Building Council
- United States Navy League, San Diego Council
- Urban League of San Diego County
- Vietnamese Community Association
- Vietnamese Lions Club
- Volunteer San Diego
- World Trade Center San Diego
- YMCA of San Diego County

Water Purification Demonstration Project

Stakeholder Interview Summary Report

Issues Covered in Interviews

- Level of awareness of water supply issues
- Opinions about need for additional water supplies
- Level of awareness of existing water recycling programs
- Concerns about existing water recycling programs
- Familiarity with indirect potable reuse, reservoir augmentation, or the Water Purification Demonstration Project
- Reasons for support/opposition to indirect potable reuse
- Level of confidence in the City's ability to operate a reservoir augmentation project
- Sources for water-related information
- Methods of communicating with stakeholder groups

Summary of Feedback Received

Water supply

Most of the participants interviewed had a general understanding about the sources of San Diego's water supply. A few interviewees were unsure or requested more information about the source of San Diego's water supply. Many individuals were aware that around 80 percent of San Diego's drinking water supply comes from imported sources and that San Diego has limited local water sources. There was also a general awareness about water supply challenges, such as drought, pumping restrictions, and cost increases. While the understanding of local sources and distribution ranged from basic to very technical, few were uninformed or had no understanding of where their water comes from.

The need for more water

While opinions varied on how to produce or sustain more water in San Diego, most of those interviewed agreed that San Diego needs more water for the future. Options suggested included conservation, desalination, recycled water distribution system expansion, grey water or other natural systems, and indirect potable reuse. None of the participants thought that the status quo was acceptable and all agreed that something has to be done to increase the amount of water available to San Diegans in the future. Controlling population growth was seen as an alternative solution to developing more water sources. A few did not have enough information to comment on the need for water.

Awareness of recycled water

Most of those interviewed were familiar with the recycled water distribution system, but several respondents had limited or no knowledge of it. Of those familiar with the system, most only identified it as "purple pipe." Some lacked an understanding of the water quality and/or treatment of recycled water. Nonetheless, water recycling was viewed by many as necessary in San Diego. A common question was whether the recycled water distribution system can be expanded.

Concerns about the use of recycled water

Water quality and public health or safety, were the top concerns reported by interviewees about both the current and future uses of recycled water. The cost of potable and recycled water was a concern to some of the groups, in particular industrial groups that rely on affordable water to support business and industrial growth. Nevertheless, concerns about cost were primarily deemed irrelevant if the demand for water exceeds San Diego's supply.

Prior knowledge of indirect potable reuse, advanced water treatment or reservoir augmentation

Many of those interviewed had some prior knowledge of indirect potable reuse (IPR) or reservoir augmentation. Participants typically referred to the project as the "Toilet to Tap" project at some point during the interview. While a few participants understood that the moniker is misleading, many participants only had an understanding of the project as "Toilet to Tap." This illustrates the public identity issues and challenges with the project. Also, while a few of the participants were aware of other IPR projects like the Orange County Groundwater Replenishment System, very few participants had a clear understanding of the water purification process or advanced treatment technology.

Support using recycled water for reservoir augmentation as an option

Most stakeholders personally supported reservoir augmentation and the Demonstration Project, but would require more information or would need authorization from their organizational board to formalize their support. A few participants said they are advocates of the project and would be willing to sign a letter of support. Of those that said they did not support the project, most cited concerns about safety. Several people, whether they supported the project or not, also stated a desire to see more data related to the project. Others said they would only approve of potable reuse as a last resort if the City had no other water supply options available.

Confidence in the City's ability to provide safe drinking water through reservoir augmentation

The majority of participants reported medium to high confidence in the City's ability to provide safe drinking water through reservoir augmentation. Some rated their confidence as low, claiming concerns about project budgeting, water rates, response times in case of a problem with the water, human error, and City leadership. On the other hand, many participants responded that the City has provided safe drinking water with the current treatment technology, so they do not doubt the City can continue to provide safe drinking water in the future.

Trusted sources of information on water related issues

A variety of sources were cited by participants when asked where they receive information about water related issues. Newsletters and online media were common sources of information. Other sources of information such as newspapers, radio, trade journals, and word of mouth were mentioned by participants. The San Diego County Water Authority and other water agencies were also cited by some as a source of information. There was a frustration among many with what they perceived as inconsistency in the information or lack of information about water in San Diego.

Many of the participants said the Water Authority and the City of San Diego were the most trusted sources for information on water issues, although a few people expressed that the Water Authority and the City were the sources they would be least likely to trust. Nongovernmental organizations, water experts, community leaders and the media were also listed by some as their most trusted sources.

Information requested by respondents and methods of communication

Most participants requested facts and data from the studies associated with the Demonstration Project including the limnology study, environmental impacts, water quality, job creation, and costs related to both the Demonstration Project and a possible full-scale project. Participants also wanted information on how the cost of reservoir augmentation compares to other water supply options, such as desalination, expanding the recycled water distribution system and continuing to import water. Other requests included information on timelines, health and safety issues, and which areas in the City would receive purified water. Organization leaders also wanted general and simplified information to share with their members who may not be well versed on water issues.

When asked to suggest methods of communicating with stakeholder groups, most organizations interviewed said that they have a website and newsletter and would be happy to share information about the project in some format to their constituents. Also, many participants requested a project presentation or facility tour. Some participants suggested community events and conferences to highlight the project.

AWP Facility Tour Feedback Analysis

The AWP Facility tour feedback analysis can be found in Appendix H, Section 3 – Community Outreach and Tours.

Outreach Metrics Report (March 1, 2010-December 31, 2012)

Water Purification Demonstration Project Outreach Metrics (DRAFT)
(March 1, 2010 - December 31, 2012)

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Research												
Stakeholders interviewed:			99	4	2	N/A	N/A	N/A	N/A	N/A	N/A	105
· Environmental group leaders	5 interviews	Met goal	5	0	0	N/A	N/A	N/A	N/A	N/A	N/A	5
· Multi-cultural groups/orgs	45 interviews	Exceeded goal	60	0	0	N/A	N/A	N/A	N/A	N/A	N/A	60
· Business associations	5 interviews	Exceeded goal	5	1	1	N/A	N/A	N/A	N/A	N/A	N/A	7
· Faith-based organizations	5 interviews	Exceeded goal	16	0	0	N/A	N/A	N/A	N/A	N/A	N/A	16
· Senior/service advocacy groups	3 interviews	Exceeded goal	3	0	0	N/A	N/A	N/A	N/A	N/A	N/A	3
Materials and Tools												
Project newsletters	3/year	Met goal	1	1	1	0	1	1	0	1	1	7
E-updates to key stakeholders	Bi-monthly average	Met goal	1	1	1	1	3	1	0	1	1	10
Project website updates	As needed	As needed	17	7	7	24	16	25	13	5	9	123
Website visits/month	N/A	Tracked website visits	3,414	1,587	1,476	2,847	607*	2,326	1,820	2,275	2,438	19,070 visits
Information/interest cards collected from groups	80%		81	162	104	68	2	402	198	11	28	1,056

	Notes
Research	
Stakeholders interviewed:	105 stakeholder interviews were conducted. Stakeholder interviews ended in early 2011.
· Environmental group leaders	In addition to these groups, stakeholder interviews have been conducted with federal elected officials, Native American tribes, utility agencies and a number of organizations in the fields of agriculture, real estate/construction, health care, military, education, and hospitality. For the federal elected officials, M. Steirer met with the staff for senators Boxer and Feinstein and representatives Davis, Bilbray and Filner on Sept. 15 & 16, 2010.
· Multi-cultural groups/orgs	
· Business associations	
· Faith-based organizations	
· Senior/service advocacy groups	
Materials and Tools	
Project newsletters	Published and distributed newsletters on November 29, 2012; July 26, 2012; Jan. 19, 2012; Nov. 1, 2011; June 30, 2011; March 31, 2011; and December 20, 2010. Distribute newsletter through website, email blasts, and making printed copiesavailable at tours, presentations, events, and other opportunities as needed.
E-updates to key stakeholders	Distributed e-updates on Dec. 14, 2012 (holiday e-card; 3,867 contacts); Aug. 7, 2012 (CBS8 coverage; 3,751 contacts); Feb. 10, 2012 (NYT coverage; 2,525 contacts); Dec. 15, 2011 (holiday e-card; 2,236 contacts); Dec. 9, 2011 (social media update; 2,228 contacts); Nov. 7, 2011 (10 News coverage; 2364 contacts); July 18, 2011 (AWP Facility tour invitation; 1,740 contacts); May 31, 2011 (1,209 contacts); February 28, 2011 (808 contacts); and November 23, 2010.
Project website updates	Updated on a regular basis, including project materials, links & resources, news & publications, public involvement information, site layout, tour dates, etc. Between October and December 2012, updated the public involvement and media articles pages.
Website visits/month	December 2012: 702; November 2012: 717; October 2012: 1,019; September 2012: 754; August 2012: 752; July 2012: 769; June 2012: 517; May 2012: 595; April 2012: 708; March 2012: 690; February 2012: 817; January 2012: 819; December 2011: 448; November 2011: N/A (Due to City software licensing, web stats did not track November); October 2011: 159 (Due to City software licensing, web stats only tracked Oct. 1-9); September 2011: 774; August 2011: 1,173; July 2011: 1,180; June 2011: 497; May 2011: 447; April 2011: 532; March 2011: 597; February 2011: 467; January 2011: 523; December 2010: 458 visits; November 2010: 728 visits; October 2010: 638 visits; September 2010: 714 visits; August 2010: 876 visits
Information/interest cards collected from groups	Between October and December 2012, collected 28 cards from community events and speakers bureau presentation. Prior to October 2012, received interest cards from speakers bureau presentations, stakeholder interviews, community events, facility tours, EIS, SDSU research class and other outreach.

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Brief city council district offices	N/A	Briefed mayor and 7 councilmembers.	8	2	1	4	1	3	0	3	2	24 tours/ briefings
Informational items distributed at presentations and stakeholder interviews	1 to each attendee	Distributed informational items	1,397	~300	~350	~480	~120	~190	~170	~140	~350	~3,497
Virtual AWP Facility tour DVDs distributed	N/A	Distributed DVDs and video	N/A	N/A	N/A	N/A	10	~40	0	0	0	~62
Community Outreach and Tours												
Present to chambers of commerce throughout the region	80%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Present to city boards and commissions	100%	Regularly updated NR&C and IROC	7	3	2	2	2	2	2	2	2	24

	Notes
Brief city council district offices	Briefed new councilmembers from districts 5 and 7 in November 2012. In August 2012, provided tours to Councilmember-elect Mark Kersey and staff from Councilmember Alvarez's office. In July 2012, provided tour to staff from Councilmember DeMaio's office. In February 2012, provided AWP Facility tour for CD 4 and 6 Councilmembers and staff. CD 4 posted tour photos on district website. In January 2012, provided AWP Facility tour for CD 7 Councilmember and staff. In December 2011, provided tour of the AWP Facility for CD 4 staff. Provided tours of the AWP Facility for Mayor Sanders and Councilmembers from CD 1, 2, 3, and 8. Briefed CD 8 councilmember in June 2011 in preparation for his speaking role at media day at the AWP Facility. M. Steirer briefed new council members in CD 6 and 8 in January 2011 and provided them with outreach materials and data for their council district. Contacted all council district offices in July 2010 and on the mayor's docket briefing on July 22, 2010.
Informational items distributed at presentations and stakeholder interviews	Fact sheet, FAQ, and info cards were made available to each presentation attendee. (Speakers bureau flier, project newsletter, tour flier, speaker's bio and evaluation form were given only to the point of contact for presentations.)
Virtual AWP Facility tour DVDs distributed	Prior to June 2012, distributed DVDs to OzWater'12 Conference; University of New South Wales/national demonstration education and engagement program; Brisbane water officials; the offices of Senator Vargas; Senator Kehoe; Senator Wyland; Assemblymember Garrick; Assemblymember Hueso; Assemblymember Fletcher; members present during the March 20, 2012, hearing of the Assembly Water, Parks, and Wildlife Committee; San Diego City Councilmembers, Mayor and library PIO; and SDCWA board members. Posted on website, intranet, CityTV and YouTube.
Community Outreach and Tours	
Present to chambers of commerce throughout the region	Present to chambers upon request.
Present to city boards and commissions	Currently plan to meet with NR&C and IROC. Between October and December 2012, provided updates to IROC Outreach and Communications Subcommittee in October and December 2012. Previously, provided updates to NR&C in September, July, May, April and March 2012; October, September, August, May, April, March, and February 2011; and December, October, September, June, April, March, and February 2010. Updated IROC Public Outreach, Education & Customer Service Subcommittee in March 2012 and October 2011. Provided update to IROC E&T Subcommittee in January 2011.

Water Purification Demonstration Project Outreach Metrics (DRAFT)
(March 1, 2010 - December 31, 2012)

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Community events	1/council district/ year	Participated in all council districts.	2	5	8	3	4	4	13	2	1	42
Orange County Groundwater Replenishment System & West Basin tours	As needed; up to 4/year	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Urban Water Cycle tours	As needed	Conducted tours	N/A	6	11	0	N/A	N/A	N/A	N/A	N/A	17
Advanced Water Purification Facility tours	6/month	Exceeded goal	N/A	N/A	9	79	36	32	34	27	26	243

	Notes
Community events	Hosted informational booths at numerous community events and engaged a number of booth visitors in discussing the project and signing interest cards. The number of overall event attendees and visitors engaged by project staff are listed below. Between October and December 2012, participated in the Filipino-American Festival (11,500 attendees; 259 booth visitors).Prior to July 2012, participated in the San Diego Horticultural Society meeting (300 attendees; 50 booth visitors); Mira Mesa Town Council Street Fair (3,000 attendees; 150 booth visitors); Juneteenth Celebration (2000 attendees; 68 booth visitors); Allied Gardens SpringFest (15,000 attendees; 175 booth visitors); Scripps Ranch Community Fair (2500 attendees; 120 booth visitors); Fiesta de los Penasquitos (18,000 attendees; 77 booth visitors); Clairemont Garden Tour & Expo (600 attendees; 20 booth visitors); Logan Heights Library Earth Day Event (71 attendees; 20 booth visitors); BD Biosciences Earth Day Fair (150-200 attendees; 26 booth visitors); Take Your Sons and Daughters to Work Day (250 attendees; 45 booth visitors); Scripps Research Institute Employee Fair (2000 attendees; 52 booth visitors); City of San Diego Celebrate the Earth (1,000 attendees; 12 booth visitors); EarthFair (60000 attendees; 196 booth visitors); Linda Vista Multicultural Festival (20000 attendees; 368 booth visitors); Qualcomm Earth Day Event (2,000 attendees; 182 booth visitors); the SDSA High Tech Fair (3,000 attendees; 700 booth visitors); Greater San Diego Science and Engineering Fair (750 fair participants; over 100 judges); San Diego Science Festival Expo Day (27,000 attendees; 740 booth visitors); and Rolando Street Fair (8,000 attendees; 79 booth visitors); the Girl Scouts World of Water Workshop (120 attendees; 49 booth visitors), Serra Mesa Community Fair (5,000 attendees; 140 booth visitors), Wesley Methodist Church Health Fair (300 attendees overall, 65 booth visitors), FilAmFest (12,000 attendees overall; 339 booth visitors); Politifest (500 attendees; 50 booth visitors), Mira Mesa Town Council Street Fair (10,000 attendees overall, 200 booth visitors), Fiesta del Sol (60,000 attendees), RiverFest (6,000 attendees), Sally Ride Science Festival (145 attendees), Take Your Daughters and Sons to Work Day (100 attendees), EarthFair (60,000 attendees), Qualcomm Earth Day Fair (1,000 attendees), Lao New Year Fair (2,500 attendees), Science Expo (30,000 attendees), Heritage Festival (11,000 attendees), Chinese New Year Fair (25,000 attendees), Tet Festival (20,000 attendees), Multicultural Festival (20,000 attendees), Executive Square Green Fair, and Little Italy FESTA. Provided materials for distribution at National Public Works Week and Scripps Ranch Green Fair. Continuing to schedule future events.
Orange County Groundwater Replenishment System & West Basin tours	Scheduled upon request. GWRS tour brochures and sign-up forms are provided at AWP Facility tours.
Urban Water Cycle tours	47 guests visited Point Loma Wastewater Treatment Plant and 25 guests visited Alvarado Water Treatment Plant between January and June 2011. Urban Water Cycle tours ended prior to AWP Facility tours.
Advanced Water Purification Facility tours	Hosted 243 tours for a total of 3,244 guests. Between October and December 2012, hosted 26 tours for 462 guests, including members of the general public as well as California-Nevada AWWA Conference guests, water experts from Spain, Public Utilities Department staff, UCSD Medical School students, San Jose Silicon Valley Chamber of Commerce members, middle and high school students, SDSU students, Sustainable Scripps Ranch members, CARCD conference attendees, and California Department of Public Health staff. Entire list of tours available in tour database. Tour feedback available in feedback database.

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Open house training for tour guides	1 prior to opening	Exceeded goal	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	2
Social Media, Conferences and Awards												
Present at water industry trade show/conferences	1/year	Exceeded goal	3	2	2	3	4	3	9	4	3	33
Add/update contact database	Monthly or as needed	Updated as new contacts arrive	833 new contacts	640 new contacts	185 new contacts	477 new contacts	390 new contacts	536 new contacts	998 new contacts	81 new contacts	100 new contacts	3,890 contacts
Presentations to all water and wastewater agency boards	All that may get IPR water	100% of agencies	19	0	0	0	1	0	8	0	0	24
Presentations to all cities in the county that would receive water from the AWPF.	100%	N/A	10	0	0	0	0	0	0	0	0	10 cities
Social media monitoring:	N/A	In progress										
Posts/tweets			0	2	0	35	116	306	133	175	149	916
Comments/Mentions			0	0	0	8	11	34	14	15	5	87
Retweets			0	0	0	2	2	20	6	13	11	54

	Notes
Open house training for tour guides	Katz & Associates conducted a presentation skills training for tour guides on June 23, 2011. L. Macpherson held a training meeting on June 2, 2011, to review tour guide script and tour set-up.
Social Media, Conferences and Awar	
Present at water industry trade show/conferences	Developed and submitted abstracts for upcoming conferences. Between October and December 2012, presented at the California Lake Management Society conference in San Diego in October 2012 and presented at the CA-NV AWWA conference in San Diego in October 2012 (two different presentations). Prior to this quarter, presented at the 2012 Annual WateReuse Symposium in Florida in September 2012 (two different presentations), both CA-NV AWWA Desalination Committee Workshops in Foster City and Fountain Valley in August 2012, WateReuse Association webinar in June 2012, WESTCAS conference in June 2012, AWWA ACE 12 in Dallas in June 2012 (three different presentations), WateReuse Reuse & Desalination Research Conference in San Diego in June 2012 (three different presentations), Ozwater'12 in May 2012, WateReuse California conference in Sacramento in March 2012 (presented and hosted a poster display), ASCE Region 9 Annual California Infrastructure Symposium in Sacramento in February 2012, 2011 Potable Reuse Conference in November 2011 in Florida (three different presentations), WEFTEC 11 conference in October 2011 in Los Angeles, ACWA Continuing Legal Education workshop in September 2011 in San Diego, WateReuse Symposium in September 2011 in Phoenix (two different presentations), AWWA ACE 2011 in June 2011 in Washington, D.C. (two different presentations), WateReuse California Annual Conference in March 2011 in Dana Point, the Utilities Management Conference in February 2011, the WateReuse Symposium in September 2010 in Denver, AWWA ACE 2010 in June 2010, and WateReuse California annual conference in March 2010 (presented and staffed an exhibit).
Add/update contact database	Added 100 contacts between October and December 2012. The total number of contacts is 3,890.
Presentations to all water and wastewater agency boards	Invited SDCWA Board of Directors and all member agency GMs, board members and chief engineers to a tour of the AWP Facility in May 2012. Representatives from 13 agencies attended. Presented to the CWA board in December 2011. Presented to Olivenhain Municipal Water District on Nov. 17, 2010. Presented to the SDCWA board meeting on Aug. 26, 2010. The 36-member Water Authority board represents 24 agencies. Presented to the SDCWA member agency GM meeting on Aug. 17, 2010.
Presentations to all cities in the county that would receive water from the AWPF.	Made a full presentation to Metro JPA on Dec. 2, 2010. Cities of Chula Vista, Coronado, Del Mar, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, and San Diego were present. County of San Diego, Otay Water District, Metro TAC and IROC were also present. M. Steirer presented briefly to Metro JPA on Aug. 5, 2010.
Social media monitoring:	PIOs and staff monitor the project Facebook and Twitter sites. Between October and December, the City posted 83 wall updates to Facebook and 66 tweets to Twitter. The public posted 1 comment on Facebook and 4 mentions and 11 retweets on Twitter about the Demonstration Project. In total, the project has made 916 posts or tweets. The public has posted 87 comments or mentions on Facebook and Twitter and 54 retweets on Twitter.
Posts/tweets	
Comments/Mentions	
Retweets	

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Awards earned	N/A	Earned local and national awards.	0	0	0	1	0	1	0	1	1	4
Media Outreach												
Media contact database: create and update	N/A	N/A	82	81	81	81	81	87	87	87	240	270 contacts
Post news articles on project website	Update monthly	Ongoing	20	3	3	10	8	11 posted; 13 pending	13	1	1	83 posted
News releases	3/year	Exceeded goal	N/A	N/A	1	2	2	9	1	3	2	20 releases
Project briefings with editorial staff – community and special interest newspapers	80%	N/A	N/A	N/A	N/A	4	0	1	0	1	0	6
Project briefings with editorial staff – daily papers	100%	Met goal	N/A	N/A	4	3	0	3	0	0	0	9
Template article to community and special interest papers	50% publication rate	Met goal	N/A	N/A	N/A	10	1	7	1	1	0	20 covered

	Notes
Awards earned	Recognized in December 2012 by ACWA as a Best in Blue 2012 finalist for achieving communications excellence. Received the 2012 WateReuse Association Small Project of the Year award in September 2012. Project Director Marsi Steirer received the 2012 WateReuse California Recycled Water Advocate of the Year award in March 2012. Received the 2011 WateReuse Association Public Education Program of the Year award in September 2011.
Media Outreach	
Media contact database: create and update	Have 270 media contacts in all.
Post news articles on project website	Posted 86 related media clips on the project's News and Publications Page. Between October and December 2012, posted KPBS (San Diego seeks a swifter current for water recycling).
News releases	Between October and December 2012, distributed news releases to SDSU and Scripps Ranch for inclusion in their newsletters. Covered in Scripps Ranch Newsletter in December. Prior to October 2012, distributed news release regarding WateReuse Association award, Drinking Water Week and the tour open house in May 2012. Pitched story and provided news releases about tour visits to 13 community papers. Distributed releases in July and September 2011 to entire distribution list. Mayor's Office distributed advisory about AWP Facility opening in June 2011.
Project briefings with editorial staff – community and special interest newspapers	Since 2010, met and/or spoke with reporters from San Diego Monitor, Mission Valley News, Tieng Nuoc Toi Radio (Vietnamese radio), Filipino Press, Epoch Times and GrokSurf blog. [Some of these briefings overlap with the AWPF reporter tour metric.]
Project briefings with editorial staff – daily papers	Since 2010, met and/or spoke with reporters from San Diego Union-Tribune, New York Times and the Atlantic/Wall Street Journal. Previously met and/or spoke with reporters and editors from San Diego Union-Tribune (twice), North County Times, Voice of San Diego, KPBS (twice), and New York Times. [Some of these briefings overlap with the AWPF reporter tour metric.]
Template article to community and special interest papers	Prior to October 2012, distributed template article about the AWP Facility to San Diego Horticultural Society and covered in August 2012 newsletter. Distributed template article about preliminary testing and monitoring results to WateReuse Association's San Diego chapter and covered in May 2012 newsletter. Distributed updated template article about AWP Facility to 82 publications in February 2012. Scoop San Diego/Mission Valley News, ecoBLOGic, WateReuse Association, Alpine Community Network newsletter, Beach and Bay Press, and My Clean Water Act covered the Demonstration Project based on the template article. In March 2012, provided AWP Facility template article to Councilmembers Zapf and Young to include in their newsletters. Council President Young covered the Demonstration Project in his newsletter. US Mayor covered the AWP Facility in December 2011 based on the updated project template article distributed in November 2011. Distributed original template article about the project opening in July 2011 to media list, trade journals and stakeholder newsletters. Mission Times Courier, the Mission Valley News, the La Jolla Light and sister papers, the Emerald News, the San Diego Metro, SCAP Monthly Update, Desalination & Water Reuse, WateReuse Association, WaterTechOnline.com, ACWA News, and AWWA Streamlines covered the AWP Facility based on the template article.

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Advertise AWPF tours in community and ethnic papers	N/A	N/A	N/A	N/A	1	6	0	0	1	1	0	9
Story ideas to science and environmental reporters (print, radio and television), as well as to reporters who write about more general issues	3/year	Exceeded goal	1	2	3	0	1	2	0	2	1	12
AWPF tour for all science and environmental reporters (print, radio and television) , as well as to reporters who write about more general issues	100% attend	N/A	N/A	N/A	1	5	0	3	1	2	1	13
Project articles in stakeholder publications or websites	4/year	Have not met goal	0	0	0	3	0	3	0	0	0	4
PSA production for city cable channel	3 over project life	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Speakers Bureau												
Presentation skills training for all members	N/A	N/A	3	0	1	0	0	1	0	0	0	5
Include presentation contact information on all materials and website	N/A	Included on all info. materials	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Information/Interest cards distributed to members of groups having presentation	100%	100%	59	9	12	13	4	5	7	10	13	132

	Notes
Advertise AWPF tours in community and ethnic papers	Between July and September 2012, advertised AWP Facility tours in the VOSD Monthly magazine. Prior to July 2012, advertised AWP Facility tours on the Voice of San Diego website and emails (June 2012), and in We Chinese in America (August 2011), Filipino Press (August 2011), La Prensa (July 2011), El Latino (July 2011), San Diego Monitor (July 2011), Giving Back Magazine (July 2011), and Voice and Viewpoint (June 2011).
Story ideas to science and environmental reporters (print, radio and television), as well as to reporters who write about more general issues	Worked with reporters to develop "Changing Public Perceptions" (OpFlow, December 2012), "You are Drinking What?" (Wall Street Journal, August 24, 2012), "Wade in the Water" segment (KFMB, August 6, 2012), "As 'Yuck Factor' Subsides, Treated Wastewater Flows From Taps" (New York Times, Feb, 10, 2012) and "Where toilet-to-tap fears circle the drain" (San Diego Union-Tribune, Jan. 21). Prior to January 2012, worked with reporters to develop "Future of Water on Display" (US Mayor, Dec. 19, 2011), "Will Mayor sip purified sewage?" (Voice of San Diego, June 30, 2011), "Wastewater getting new life across county" (UT, May 15, 2011), "San Diego launches landmark water project" (UT, June 30, 2011), "From Toilets to Tap" (USA Today, March 3, 2011), "The yuck factor: Get over it" (UT, Jan. 23, 2011), and "New Source of Drinking Water Hinges on Pilot Project" (UT, Oct. 11, 2010).
AWPF tour for all science and environmental reporters (print, radio and television) , as well as to reporters who write about more general issues	Between October and December 2012, provided AWP Facility tour to Tom Fudge of KPBS (December 10, 2012) . Prior to October 2012, provided tours or visits of the AWP Facility to KFMB, San Diego Monitor, Voice of San Diego, Mission Valley News, Epoch Times, New York Times (twice – reporter and photographer), Filipino Press, Tieng Nuoc Toi Radio (Vietnamese radio), and San Diego Union-Tribune (twice). Held a news conference and offered a tour for media, including science and environmental reporters, on June 30. Local media attended, including Daily Transcript, Voice of San Diego, and television stations (KUSI, KGTV, KFMB, KNSD and Univision).
Project articles in stakeholder publications or websites	Distributed updated AWP Facility tour template article to stakeholders in February 2012. San Diego Coastkeeper and I Love a Clean San Diego published articles. Distributed facility opening article to stakeholder contacts in July 2011. San Diego Coastkeeper and Equinox Center published articles in their newsletters.
PSA production for city cable channel	Will use virtual tour video footage to develop a PSA.
Speakers Bureau	
Presentation skills training for all members	Conducted workshops on June 28, May 25, and May 24, 2010. Held meetings on June 1, 2011 and January 10, 2012, to update speakers bureau staff on AWPF tour promotion and presentation slide edits.
Include presentation contact information on all materials and website	Included the following language: For more information, please call (619) 533-7572 or email purewatersd@sandiego.gov.
Information/Interest cards distributed to members of groups having presentation	Cards were available to all speakers bureau presentation attendees.

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Categorize presentations by council district	N/A	Presented in all districts										
Council District 1			6	1	1	4	1	0	0	1	1	15
Council District 2			11	3	3	3	0	0	0	1	3	23
Council District 3			3	1	3	0	0	0	3	0	0	10
Council District 4			3	0	2	2	0	0	2	5	2	16
Council District 5			5	0	0	0	0	0	0	1	3	9
Council District 6			7	1	1	0	2	2	0	0	1	14
Council District 7			10	2	1	0	0	2	0	0	0	15
Council District 8			7	1	1	0	0	0	0	0	0	9
Outside City Boundaries			15	2	1	4	1	1	1	3	3	31
Total			59	9	12	13	4	5	7	10	13	132
Evaluation forms received from groups having presentations	50%	Received 29%.	14	4	9	6	0	2	2	2	2	41
Speaker tracking forms collected	100%	Received 67%.	42	8	11	10	2	3	7	3	0	86
Type of groups that received presentations:		Presented to all types of identified groups										
Environmental	80%		3	1	1	0	0	0	0	2	1	8
Multicultural groups/orgs	50%		3	0	2	0	0	0	0	2	0	7
Business associations/BIDs	50%		3	0	0	0	0	0	0	0	1	4
Senior/service groups	30 groups		0	0	0	0	0	0	1	0	0	1
Civic/social clubs	80%		3	1	5	5	2	1	1	1	0	19
City planning groups	80%		16	2	3	0	0	0	0	2	2	25
Community/recreation councils	80%		17	3	1	3	0	0	4	2	4	34
Religious	N/A		1	0	0	0	0	0	0	0	0	1
Medical	N/A		0	0	0	0	0	0	0	0	0	0
Water Industry	N/A		7	0	0	3	2	1	1	1	2	17
School	N/A		1	1	0	1	0	2	0	0	3	8
Government/Internal City	N/A		5	1	0	1	0	1	0	0	0	8

	Notes
Categorize presentations by council district	Completed 132 presentations, 13 of which were between October and December 2012. Some presentations may be categorized in more than one district.
Council District 1	
Council District 2	
Council District 3	
Council District 4	
Council District 5	
Council District 6	
Council District 7	
Council District 8	
Outside City Boundaries	
Total	
Evaluation forms received from groups having presentations	From the 13 presentations completed between October and December 2012, two evaluation forms were received. 41 forms have been received in all.
Speaker tracking forms collected	From the 13 presentations completed between October and December 2012, 0 speaker tracking forms were received. 86 forms have been received in all.
Type of groups that received presentations:	132 presentations in all have been completed.
Environmental	
Multicultural groups/orgs	
Business associations/BIDs	
Senior/service groups	
Civic/social clubs	
City planning groups	
Community/recreation councils	
Religious	
Medical	
Water Industry	
School	
Government/Internal City	

Water Purification Demonstration Project Outreach Metrics (DRAFT)
(March 1, 2010 - December 31, 2012)

	Goal	Status	2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Total
Stakeholder/Partner Communications												
American Assembly group outreach letter	N/A	Completed in 2010	63	63	63	63	63	63	63	63	63	63 members
Project inquiries received by phone and e-mail and responded to	Track number	Tracked all calls and emails.	2	20	8	61	17	22	26	21	5	182
Internal Department Communication												
Post project updates on the public utilities section of city employee intranet site	2/year	Exceeded goal	N/A	N/A	2	2	2	1	0	1	2	10
Provide one staff education session at employee mtgs/training to each key division of PUD that has public contact	1/year	Exceeded goal	6	0	0	10	0	3	1	0	4	24
Article published in Pipeline	1/year	Exceeded goal	1	1	3	2	1	3	1	0	2	14

	Notes
Stakeholder/Partner Communications	
American Assembly group outreach letter	Sent follow-up email in March 2012 to members reminding them to tour the facility or register for a presentation. Invited members to tours of the AWP Facility in June 2011. Sent outreach letter on Nov. 18, 2010.
Project inquiries received by phone and e-mail and responded to	Does not include those that contacted staff regarding tour reservations.
Internal Department Communication	
Post project updates on the public utilities section of city employee intranet site	Between October and December 2012, posted the Fall 2012 Pure News and an invitation to tour the AWP Facility on the Public Utilities intranet page. Prior to October 2012, posted the Summer 2012, Winter 2012, Fall 2011, Summer 2011, Spring 2011, and Winter 2011 Pure News, the video of the virtual AWP Facility tour and an invitation to tour facility on the Public Utilities intranet site.
Provide one staff education session at employee mtgs/training to each key division of PUD that has public contact	Between October and December 2012, conducted two AWP Facility tours for EMTS Public Utilities staff in October and two AWP Facility tours for Public Utilities staff in December 2012. Prior to July 2012, conducted a tour for the Public Utilities Mentorship program in April 2012, conducted 11 City-employee-only tours. Presented project at the Engineering and Program Management division meeting in August 2011, the Customer Care Solutions Project Team meeting in January 2011, the Public Utilities Executive Team meeting in September 2010, the Employee Services and Internal Controls division meeting in October 2010, three sessions at the Wastewater Fall Classic Annual Training Tailgate in October and November 2010, and the Long-Range Planning & Water Resources division meeting in spring 2010.
Article published in Pipeline	WPDP outreach was covered in December, November, April, March, February and January 2012 issues, October, August, July, June, May, April and March 2011 issues and the December 2010 issue.

Appendix H: Public Outreach and Education

Section 2: Education and Outreach Materials and Tools

Fact Sheet

Fact Sheet

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

Recycled Water

The City of San Diego has limited local water sources and relies on importing approximately 85 to 90 percent of its water supply. In the past, importing water from the Colorado River and Northern California has been a low-cost, reliable option, but environmental stresses and court-ordered pumping restrictions have continued to reduce the amount of water that can be delivered to San Diego. These circumstances and the threat of further limitations on our water supplies have intensified the need for new sources of water. As part of the City's effort to provide a local and sustainable water supply, the Water Purification Demonstration Project is examining the use of water purification technology to provide safe and reliable water for San Diego's future.

The Demonstration Project is the second phase of a process evaluating ways for the City to increase its use of recycled water. The first phase was the City's 2005 Water Reuse Study that identified reservoir augmentation as the preferred option for developing recycled water sources. The Demonstration Project will determine if reservoir augmentation is a feasible option for San Diego.

Reservoir augmentation is a multi-step process that includes:

- Using water purification technology on recycled water
- Sending the purified water to a reservoir to blend with existing water supplies
- Treating the blended water again to be distributed as drinking water

The Demonstration Project is underway and will conclude in early 2013. During this time, the Advanced Water Purification Facility will operate for approximately one year and will produce 1 million gallons of purified water per day. A study of the San Vicente Reservoir is being conducted to test the key functions of reservoir augmentation and to determine the viability of a full-scale project. No purified water will be sent to the reservoir during the demonstration phase.

An independent advisory panel of experts is providing oversight on project research to determine (1) if the purification process satisfies all water quality, safety and regulatory requirements of the California Department of Public Health, and (2) the behavior of the reservoir and what will happen if the purified water is added. A summary report detailing the results of the Demonstration Project will be provided to the Mayor and City Council. If deemed technically feasible, and following Mayoral and City Council authorization, a full-scale reservoir augmentation project would be implemented.

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

Potential benefits of implementing Reservoir Augmentation in San Diego:

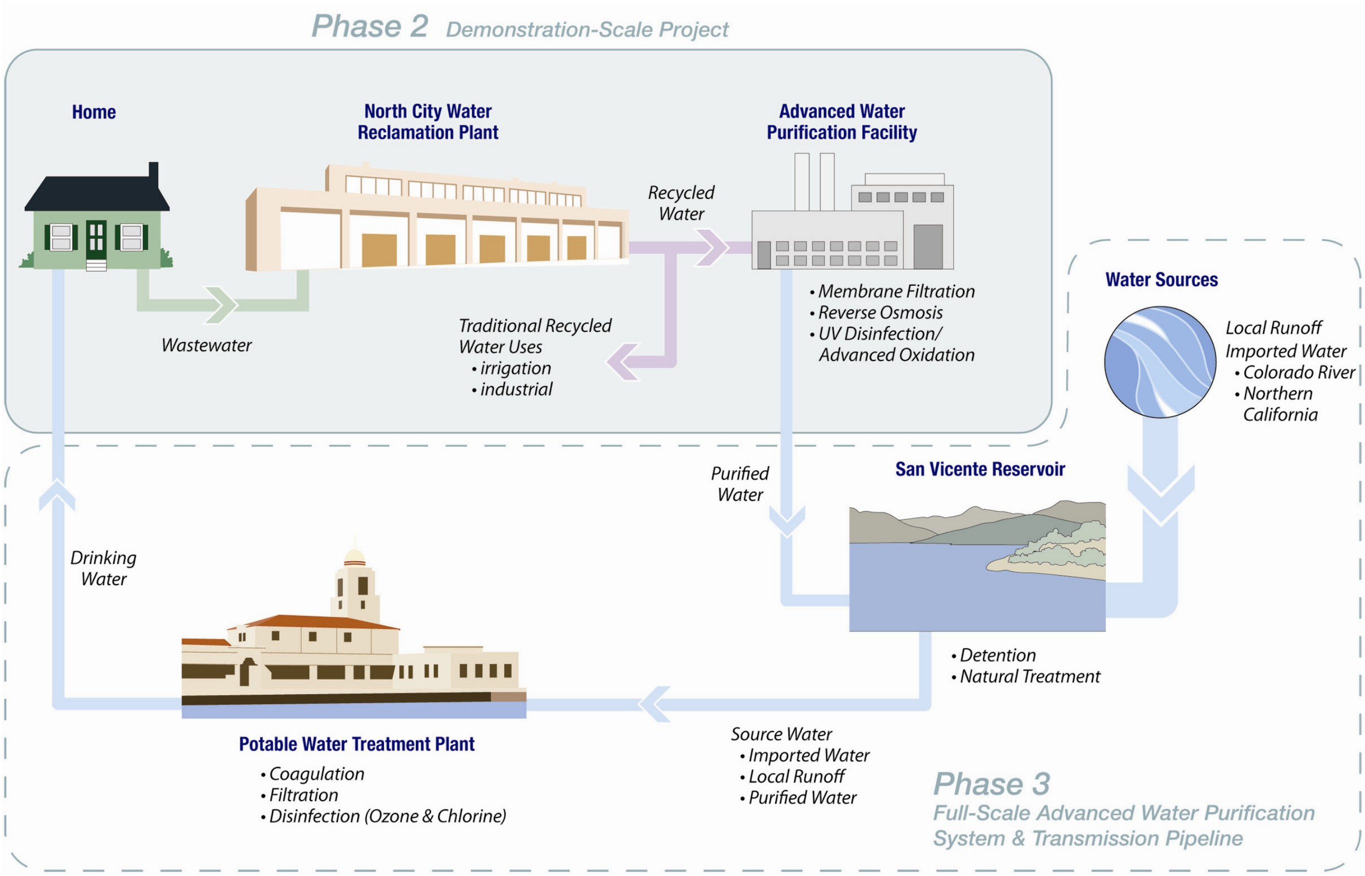
- Provide a local and sustainable supply of purified drinking water for San Diego
- Improve the quality of water in the San Vicente Reservoir
- Decrease dependence on imported water
- Increase utilization of recycled water
- Provide a supply of water that uses less energy than imported water
- Have a positive impact on the environment by producing less discharge into the ocean and working toward lower carbon emissions

In an effort to keep San Diego citizens informed about this important project, the public outreach program is offering free tours of the Advanced Water Purification Facility and project presentations will be made to groups upon request. For more information, please call (619)533-7572 or email purewatersd@sandiego.gov. To register for a tour please visit www.purewatersd.org.

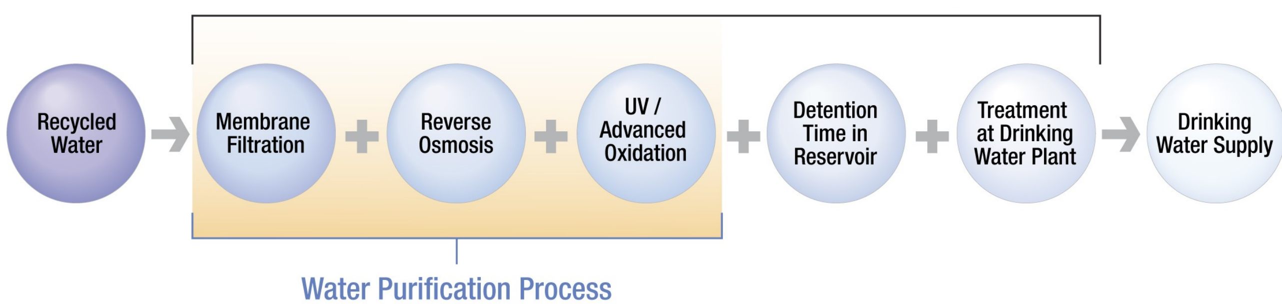
The City of San Diego

City of San Diego PUBLIC UTILITIES Water & Wastewater

Water Purification Demonstration Project
Advanced Water Purification Process



Multi-Barrier Water Treatment Steps



The multiple barrier approach is a proven means to protect public health. Each barrier or step must have frequent and continuous water quality monitoring. Safeguards are built into the process to insure that a failure or error at any given treatment step would not compromise public health.

Fact Sheet

Water Reuse Program

Proyecto de Demostracion de Purificacion de Agua

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project


Agua Reciclada

La Ciudad de San Diego cuenta con limitados recursos de agua, y tiene que importar aproximadamente entre el 85 y el 90 por ciento de su suministro de agua. En el pasado, la opción de importar agua del Río Colorado y del Norte de California ha sido una opción confiable y baja en costo, pero los retos ambientales y las restricciones impuestas por los tribunales relativas a la posibilidad de bombeo, han contribuído a una reducción adicional sobre la cantidad de agua que puede ser distribuída a San Diego. Dichas circunstancias y la amenaza de limitaciones adicionales sobre nuestro suministro de agua han intensificado la necesidad de identificar nuevas fuentes de agua. Como parte del esfuerzo de la Ciudad en proveer un suministro de agua local y confiable, el Proyecto de Demostración de Purificación de Agua analiza el uso de tecnología avanzada de purificación de agua para proveer agua confiable y segura para el futuro de San Diego.

El Proyecto de Demostración es la segunda fase de un proceso que evalúa las formas en qué la Ciudad puede incrementar su uso de agua reciclada. La primera fase consistió en el Estudio de Reuso de Agua de la Ciudad del 2005, misma que identificó como opción preferida la de aumentar el nivel de agua en los embalses artificiales como vía para desarrollar fuentes de agua reciclada. El Proyecto de Demostración determinará si el aumentar la capacidad de los embalses artificiales es una opción factible para San Diego.

El aumentar el agua en los embalses artificiales es un proceso de múltiples pasos que incluye:

- Utilizar tecnología avanzada de purificación de agua para aguas residuales altamente tratadas.
- Enviar el agua purificada para almacenarse en un embalse artificial para ser mezclado con suministros de agua actuales
- Tratar el agua mezclada nuevamente para ser distribuido como agua potable

Actualmente se lleva a cabo el Proyecto de Demostración, el cual concluirá a principios del 2013. Durante dicho período, las Instalaciones Avanzadas de Purificación de Agua operarán durante aproximadamente un año y producirán 1 millón de galones de agua purificada al día. Se está realizando un estudio del Emabalse Artificial San Vicente para evaluar las funciones claves relacionadas con aumentar la capacidad del agua en los embalses arificiales así como determinar la viabilidad de un proyecto a gran escala. No se enviará agua purificada al embalse artificial durante la fase de demostración.

Un panel asesor independiente integrado por expertos supervisará la investigación del proyecto para determinar si (1º.) el sistema de purificación satisface todos los requisitos de calidad, seguridad y normatividad del agua del Departamento de Salud Pública de California, y (2º.) el comportamiento del embalse artificial y de lo que ocurriría si se agregase el agua purificada. Un informe resumido que detalla los resultados del Proyecto de Demostración se entregará al Alcalde y al Cabildo de la Ciudad de San Diego. Si se considera técnicamente factible y es seguido por la autorización de parte del Alcalde y del Cabildo, se llevaría a cabo un proyecto para aumentar la capacidad del agua en un embalse artificial a gran escala.

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

Posible beneficios generados al aumentar el agua en los embalses artificiales en San Diego:

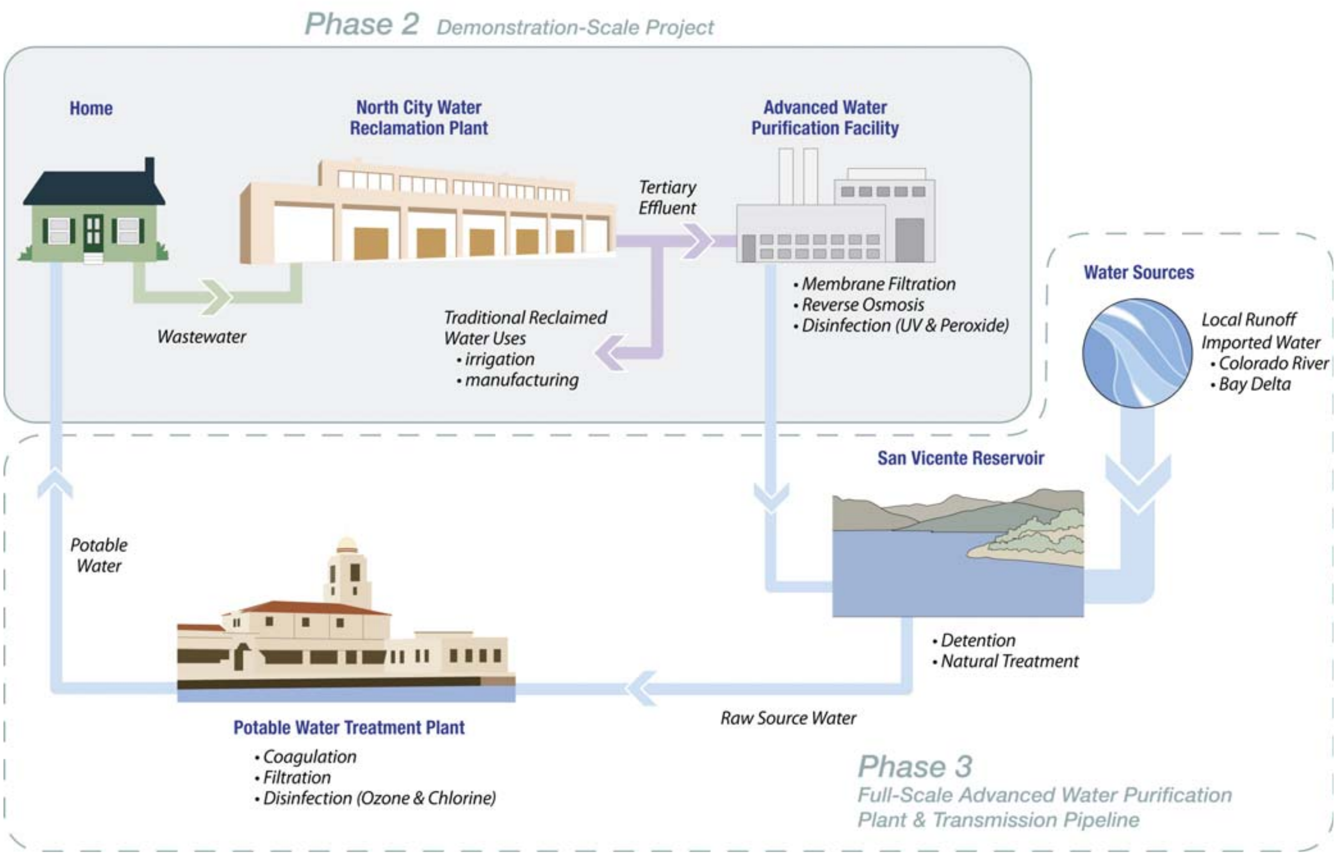
- Proveer una fuente local y sustentable de agua potable de alta calidad para San Diego.
- Incrementar el uso de agua reciclada.
- Reducir la dependencia sobre al agua importada.
- Proveer un abastecimiento de agua que utiliza menos energía que el agua importada.
- Mejorar la calidad del agua en el Embalse Artificial de San Vicente.
- Surtir un impacto positivo sobre el medio ambiente al producir menos descarga al mar y trabajar para reducir las emisiones de carbón.

Para mantener informados a los ciudadanos sandieguinos sobre este importante proyecto, el programa de difusión pública ofrecerá recorridos de cortesía de las Instalaciones Avanzadas de Purificación del Agua, y se podrán organizar presentaciones sobre el proyecto a grupos que así lo soliciten. Para mayor información, favor de comunicarse al (619) 533-7572 o enviar un correo electrónico a purewatersd@sandiego.gov.

THE CITY OF SAN DIEGO

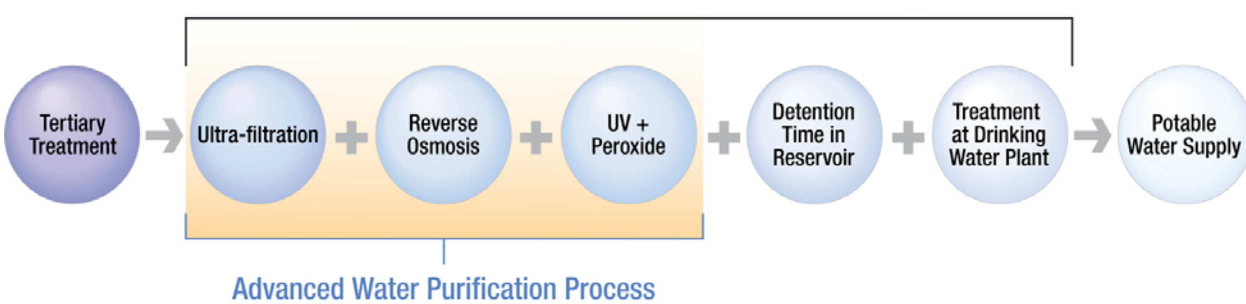
City of San Diego PUBLIC UTILITIES Water & Wastewater

Proceso Avanzado de Purificacion del Agua



Toda el agua potable se recicla en algún momento. El agua Purificada a Niveles Avanzados se aproxima a la calidad de agua destilada y es más limpia que el agua que actualmente se encuentra en el Embalse Artificial de San Vicente.

Pasos para la Purificación Avanzada del Agua



Water Reuse Program

Dự án lọc nước thí điểm
Bản thông tin chung về các giai đoạn

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project


Recycled Water

A water resource strategy that includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection is helping to meet future water needs.

Thành phố San Diego có rất ít nguồn cung cấp nước tại địa phương và phụ thuộc vào việc nhập khẩu khoảng 85% đến 90% trong tổng số lượng nước cần để cung cấp. Trong thời gian qua, việc nhập khẩu nước từ sông Colorado và phía Bắc tiểu bang California là một lựa chọn có chi phí thấp, đáng tin cậy; tuy nhiên, những yếu tố gây bất lợi đến môi trường cùng với lệnh giới hạn việc bơm nước từ tòa án đã liên tục làm giảm đi lượng nước có thể đưa vào San Diego. Những thực trạng như vậy và nguy cơ có các hạn chế khác ảnh hưởng đến nguồn cung cấp nước cho San Diego đã làm nhu cầu về việc có những nguồn nước khác thay thế trở nên cấp thiết hơn. Dự án lọc nước thí điểm, một phần trong nỗ lực của Thành phố nhằm tạo nguồn cung cấp nước dài hạn ngay tại địa phương, sẽ xem xét việc sử dụng công nghệ lọc nước tiên tiến để cung cấp nguồn nước an toàn và lâu dài trong tương lai cho San Diego.

Dự án thí điểm là giai đoạn thứ hai của quá trình đánh giá các phương thức giúp Thành phố gia tăng khả năng sử dụng nguồn nước tái chế. Giai đoạn đầu, được thực hiện vào năm 2005 thông qua "*Chương trình nghiên cứu khả năng tái sử dụng nguồn nước*" của Thành phố, đã xác định việc gia tăng lượng nước trong hồ chứa là lựa chọn được ưu tiên dành cho việc phát triển các nguồn nước tái chế. Dự án thí điểm này sẽ quyết định liệu việc tăng lượng nước trong hồ chứa có phải là một lựa chọn khả thi cho San Diego.

Gia tăng lượng nước trong hồ chứa là một quá trình có nhiều bước gồm:

- Sử dụng công nghệ lọc nước tiên tiến để làm sạch nước thải đã qua xử lý kỹ
- Đưa nguồn nước đã được lọc sạch vào hồ chứa để hòa chung với nguồn nước hiện có
- Xử lý lại nguồn nước đã pha trộn để làm nước sinh hoạt đưa đi phân phối

Dự án thí điểm đang được tiến hành và sẽ kết thúc vào đầu năm 2013. Trong thời gian này, hệ thống lọc nước thí điểm (Water Purification Demonstration Facility) sẽ hoạt động trong khoảng thời gian một năm và sẽ sản xuất một triệu galông (gallon) nước được lọc sạch mỗi ngày. Một cuộc khảo sát nghiên cứu về khu vực hồ chứa nước San Vicente (the San Vicente Reservoir) đang được tiến hành để kiểm tra những bước vận hành quan trọng trong quá trình làm tăng lượng nước trong hồ chứa và để đánh giá tính khả thi của toàn bộ dự án. Trong giai đoạn thí điểm, nước sau khi được lọc sạch sẽ không được đưa vào hồ chứa.

Một ủy ban cố vấn độc lập gồm các chuyên gia đang giám sát việc nghiên cứu dự án để xác định (1) liệu hệ thống lọc nước có thỏa mãn các yêu cầu về chất lượng, độ an toàn và các quy định của Sở Y Tế tiểu bang California, và xác định (2) trạng thái của hồ chứa và những gì sẽ xảy đến nếu đưa thêm nước được lọc sạch vào hồ chứa. Một bản báo cáo tóm lược gồm chi tiết kết quả của dự án thí điểm sẽ được đệ trình lên ngài Thị trưởng và Hội đồng thành phố San Diego. Nếu được xem là khả thi về mặt khoa học kỹ thuật, và được Hội đồng thành phố và Thị trưởng chấp thuận thì toàn bộ các bước trong dự án bổ sung thêm lượng nước trong hồ chứa sẽ được thực hiện.

Những lợi ích tiềm năng khi thực hiện việc tăng lượng nước trong hồ chứa tại San Diego:

- Cung cấp cho San Diego nguồn nước sinh hoạt chất lượng cao, lâu dài và có sẵn tại địa phương
- Tăng cường hiệu quả sử dụng nước tái chế
- Bớt phụ thuộc vào nước nhập khẩu
- Tạo ra một nguồn cung cấp nước sử dụng ít năng lượng hơn so với nước nhập khẩu
- Cải thiện chất lượng nước trong hồ chứa San Vicente
- Có tác động tích cực đối với môi trường nhờ xả ít chất thải ra biển hơn và góp phần làm giảm chất khí thải carbon

Với nỗ lực nhằm thông báo đến cư dân thành phố San Diego về dự án quan trọng này, chương trình tiếp cận cộng đồng sẽ tổ chức các buổi tham quan (tour) miễn phí "Hệ thống lọc nước thí điểm" (Water Purification Demonstration Facility); và sẽ có những buổi thuyết trình về dự án này cho từng nhóm theo yêu cầu. Để biết thêm thông tin, xin gọi số máy (619) 533-7572 hoặc gửi email theo địa chỉ purewatersd@sandiego.gov.

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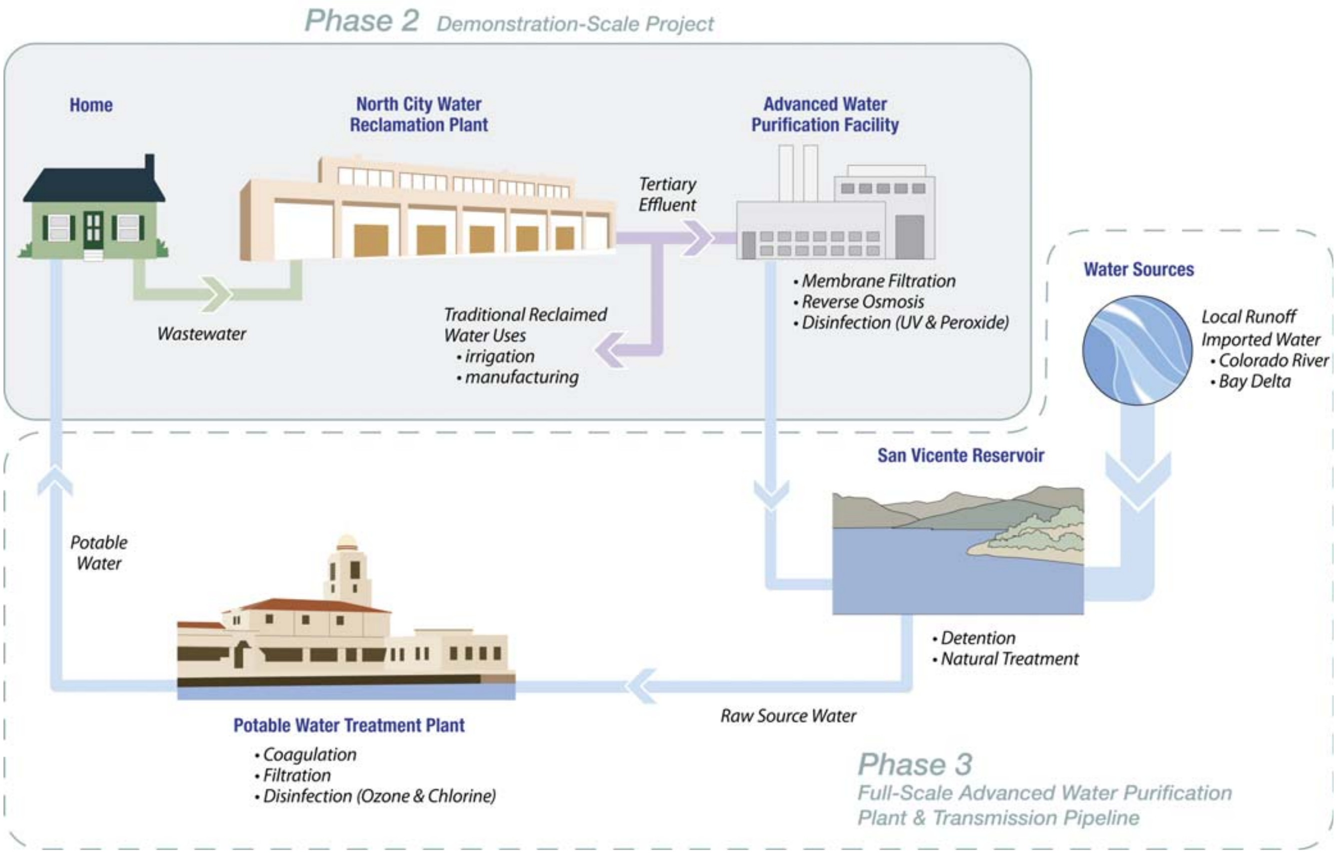
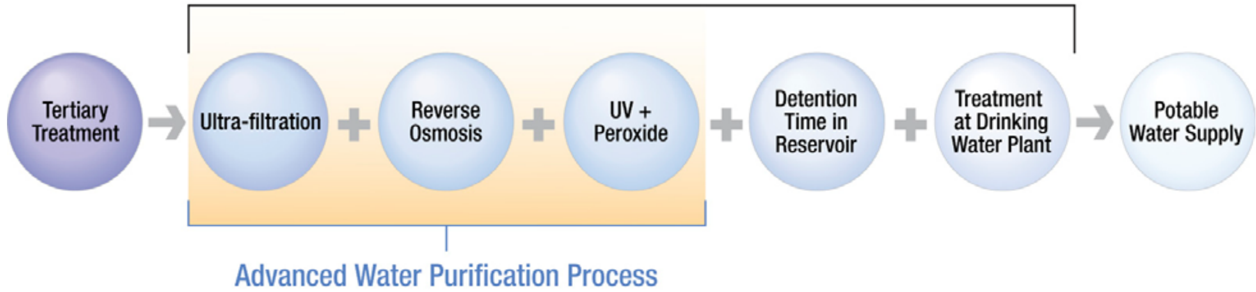
 Public Information Office 2/7/11

Water Purification Demonstration Project
Advanced Water Purification Process



Multi-Barrier Water Treatment Steps



The multiple barrier approach is a proven means to protect public health. Each barrier or step must have frequent and continuous water quality monitoring. Safeguards are built into the process to insure that a failure or error at any given treatment step would not compromise public health.

Quick Facts Document

Quick Facts

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

Recycled Water

San Diego's water supply:

- 85-90 percent imported from Northern California and the Colorado River
- Environmental stresses & pumping restrictions make importing water unreliable & expensive
- A 2005 Water Reuse Study identified reservoir augmentation as the preferred option for further developing recycled water sources

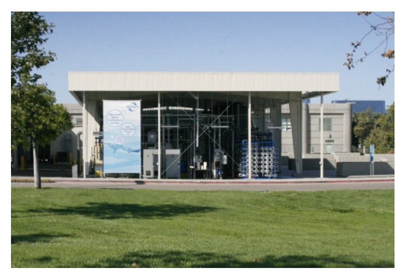
Reservoir augmentation:

- Uses water purification technology on recycled water
- Blends purified water with existing supplies in a local reservoir
- Treats the blended water further before distribution as drinking water

San Diego's Water Purification Demonstration Project (Demonstration Project):

- A test project examining the use of water purification technology
- Will determine if reservoir augmentation is a feasible option for San Diego
- Uses a multi-barrier approach in which safeguards insure that a failure at any treatment step would not compromise public health
- Purified water is not added to the drinking water system during this test phase; instead it is returned to the recycled water system

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.



Advanced Water Purification Facility:

- Purifies one million gallons of recycled water per day as part of the Demonstration Project
- Treats recycled water with a multi-barrier process of membrane filtration, reverse osmosis and ultraviolet light/advanced oxidation
- Has hosted numerous tours for local and international visitors since June 2011

Potential benefits of implementing reservoir augmentation in San Diego:

- Provide a local and sustainable supply of purified drinking water
- Improve the quality of water in the San Vicente Reservoir
- Decrease dependence on imported water
- Increase use of recycled water

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Public Information Office 3/8/12

Frequently Asked Questions (FAQ)

FAQ

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

North City Water Reclamation Plant

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

Does San Diego need more water?

Water is essential to our quality of life. The City of San Diego imports approximately 85 to 90 percent of its water supply from Northern California and the Colorado River. For the past few years, California has been affected by a historic dry period and a drought on the Colorado River. In addition, legal and regulatory decisions to protect endangered species in the Sacramento – San Joaquin Delta have resulted in restrictions on the amount of water that can be imported from Northern California. Population projections predict the City will need more water in the future than is used today. Since San Diego is at the end of the imported water pipeline, and receives an average of 10 inches of rain each year, we need to develop local water supplies to secure a reliable supply of water for present and future City of San Diego water customers.

Why can't we just conserve enough water to meet future needs?

Using water wisely through conservation practices should always be the first step in preserving the City's precious water supplies. The average water demand (which includes local surface water, imported water, conservation and recycled water) for the City of San Diego for the last six fiscal years has been approximately 260,000 acre-feet per year. The City's conservation programs have helped reduce its dependence on imported water by saving more than 34,000 acre-feet of drinking water a year. That's enough water to meet the needs of 68,000 average families of four for one year. Nonetheless, by 2030 the City will need an additional 43,000 acre-feet of water per year to meet the needs of current and future public utilities customers. So while conservation is important, efforts to save water need to be combined with other sustainable strategies if we are to have enough water for all of our needs.

Doesn't the City already recycle water?

Yes. The City of San Diego operates two water recycling facilities capable of treating 45 million gallons per day of wastewater to secondary and tertiary treatment levels. Recycled water treated to a secondary level is safe for distribution into the environment, while recycled water treated to a tertiary level undergoes further treatment so the water is safe for use in irrigation and industrial purposes.

The recycled water produced by these plants is primarily used for irrigation and industrial purposes. A separate distribution system of "purple pipes" is required to keep the recycled water separate from drinking water pipelines. Constructing additional purple pipe distribution systems is costly. Also, using recycled water for irrigation is seasonal – it is not used in rainy periods or when it is cooler. This means less than half of all wastewater available for recycling is beneficially reused. The remainder of recycled water is treated to a secondary level and discharged into the ocean. Because of the cost and the limited use of existing recycled water, the City is examining other ways to use more recycled water, including reservoir augmentation.

Does the City plan to use more recycled water?

Yes, the City has a recycled water master plan and is always looking for ways to reuse existing water supplies. In 2005 the City conducted a comprehensive, balanced, impartial and science-based Water Reuse Study of all recycled water opportunities. The study included a public

- more -

participation component and concluded that Indirect Potable Reuse through Reservoir Augmentation was the preferred method of implementing the expanded use of recycled water in San Diego.

The Water Reuse Study was the first phase of the City's plan to expand the use of recycled water. The second phase is now underway to examine the feasibility of reservoir augmentation through a demonstration project.

What is Reservoir Augmentation?
Reservoir augmentation is a multi-step process that is being examined by the Water Purification Demonstration Project. It includes using advanced water purification processes on recycled water which can be blended with existing "raw" water supplies. The Demonstration project will not send purified recycled water to a local reservoir. The concept of Reservoir Augmentation is to add purified recycled water to a local reservoir which can be treated to drinking water standards and distributed to the public.

What is the Water Purification Demonstration Project?
The Demonstration Project is the second phase of the City's plan to expand the use of recycled water. It will evaluate the use of advanced water purification technology and the feasibility of producing water that can be sent to blend with existing water in a local reservoir. The Demonstration Project includes a study of San Vicente Reservoir, research to determine a pipeline alignment, a public outreach education program and the construction and operation of a pilot scale advanced water purification facility.

Is this project toilet-to-tap?
Although "toilet-to-tap" has been used to describe this project in the past, it is not an accurate description. The notion that wastewater can be sent directly to drinking water taps is inaccurate. "Toilet-to-tap" is misleading because it ignores key treatment steps and strict testing requirements that are involved in the recycling process. In California, all forms of water are highly regulated and monitored to ensure safety. Since there is no new water on Earth, all water goes through a natural cycle and is essentially recycled water before it is treated and tested before being sent to drinking water taps. This project is strictly a demonstration and at no point during the demonstration phase will recycled water be distributed to drinking water taps.

What is the latest in water purification technology?
The Demonstration Project is using a state-of-the-art purification process that purifies treated wastewater to a level similar to distilled water quality. This process includes membrane filtration, reverse osmosis, and advanced oxidation through the use of ultraviolet light and hydrogen peroxide. The resulting purified water is of higher quality than existing raw water sources and can be used as a locally controlled source to augment reservoir supplies.

Is reservoir augmentation safe?
Yes. There are many public health protection steps that must be taken before highly purified recycled water can be used for reservoir augmentation. A state-of-the-art process of water purification produces water that is similar to distilled water quality. After this water is put in the reservoir, it blends with existing supplies of untreated or raw water. All water that is distributed to public drinking water taps must meet strict state and federal drinking water standards. Water stored in open reservoirs (lakes) is processed through a drinking water treatment plant. After this final treatment, the water meets drinking water standards before it can be distributed to homes and businesses. The water treatment and distribution system is also monitored regularly to ensure safety.

Will recycled water be added to our drinking water now?
No. The Demonstration Project will test the key functions of reservoir augmentation on a small scale and no recycled water will be sent to the reservoir or distributed to customers during the demonstration phase. The City will operate a pilot scale facility for at least one year to analyze water quality and monitoring methods. At the same time, an independent advisory panel of experts will provide oversight of project research to determine if the treatment system meets all water quality, safety and regulatory requirements necessary to determine the viability of a full-scale project.

What are the benefits of reservoir augmentation?
Reservoir augmentation can provide a locally controlled, drought-proof supply of high-quality water. If implemented, a full-scale project will increase the utilization of recycled water and save energy by reducing San Diego's dependence on imported water. Reservoir augmentation could also improve the water quality in the San Vicente Reservoir and have a positive impact on the environment by producing less discharge into the ocean.

Would you like to know more?
In an effort to keep San Diegans informed about this important project, the public outreach program is offering free tours of the Advanced Water Purification Facility and project presentations will be made to groups upon request.

For more information, please call (619)533-7572 or email purewatersd@sandiego.gov.

To register for a tour, please visit www.purewatersd.org.

FAQ

Water Reuse Program

Proyecto de Demostracion de Purificacion de Agua

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

North City Water Reclamation Plant

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

Requiere San Diego de un mayor abastecimiento de agua?
El agua es esencial para nuestra calidad de vida. La Ciudad de San Diego (Ciudad) importa aproximadamente entre el 85 y el 90 por ciento de su suministro de agua del Norte de California y del Río Colorado. Durante los últimos años, California ha sido afectado por un período histórico árido, así como por una sequía en el Río Colorado. Adicionalmente, las decisiones legales y normativas a favor de la protección de las especies en peligro de extinción en la Delta San Joaquin – Sacramento, han generado restricciones sobre la cantidad de agua que se podrá importar del Norte de California. Proyecciones demográficas pronostican que la Ciudad necesitará más agua en futuro que la cantidad que se consume hoy día. Siendo que San Diego se encuentra al final del sistema de conducción de agua importada, y que, en promedio, recibe 10 pulgadas de lluvia cada año, tendremos que desarrollar todas las posibles fuentes de agua locales para garantizar un suministro confiable de agua para residentes y negocios sandieguiños actuales y futuros.

Porqué no podemos simplemente conservar más agua?
El primer paso en la protección de nuestro suministro local de agua siempre debe ser consumir menos agua por medio de la conservación. Los programas de conservación de la Ciudad han logrado reducir nuestra dependencia sobre el agua importada generando ahorros de más de 33,000 pies-acre de agua potable en forma anual, que resulta ser cantidad suficiente para satisfacer las necesidades de aproximadamente 66,000 familias típicas durante un año. Sin embargo, reconociendo la importancia de la conservación, las iniciativas para generar ahorros en el consumo del agua tendrán que combinarse con otras estrategias sustentables para cubrir las necesidades de agua que San Diego tendrá en un futuro.

Actualmente recicla agua La Ciudad?
Sí. la Ciudad opera dos instalaciones para producir agua reciclada, mismas que son capaces de tratar 45 millones de galones de aguas negras a niveles secundarios y terciarios. Agua reciclada tratada a niveles secundarios se puede descargar al medio ambiente, mientras que agua tratada a niveles terciarios pasa por un tratamiento adicional, es entonces donde el agua se puede utilizar para riego y usos industriales.

El uso primordial de el agua reciclada producida en estas plantas es para uso de riego o industrial. La distibucion de agua reciclada requiere de un sistema de conducción independiente del sistema de agua potable, para diferenciarlo, la tubería de agua reciclada es morada, construir otro sistema de agua es costoso. Ademas, el uso de agua reciclada para riego es por temporadas, existe menos uso durante época de lluvia o de frio. Esto significa que menos de la mitad de aguas negras disponible se usa y es tratada a niveles terciarios, el resto solo es tratada a niveles secundarios y tirada al mar. Por el costo y el uso limitado de el aguay reciclada, la Ciudad esta analizando otras formas de usar agua reciclada, incluyendo la posibilidad de mandar agua reciclada a las presas.

Cuenta la Ciudad con un plan de consumo de agua reciclada?
Sí, la Ciudad cuenta con un plan maestro para el uso de agua reciclada, y siempre está al pendiente de identificar formas en que se pueda reutilizar el suministro de agua existente. En el 2005 la Ciudad realizó un Estudio de Reuso de Agua que abarco todas las oportunidades para reutilizar el agua reciclada, basado en una metodología científica que fuera completa, equilibrada e imparcial. El estudio integró un componente de participación pública y concluyó que la Reutilización Indirecta de Agua Potable a base de Aumentar los Niveles de Agua en las Presas, sería el método preferido para ampliar el mayor uso de agua reciclada en San Diego.

THE CITY OF SAN DIEGO

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- more -

El Estudio de Reuso de Agua representó la primera etapa del plan de la Ciudad en ampliar el uso de agua reciclada. La segunda fase actualmente se realiza con un proyecto de demostracion donde se analiza la factibilidad de aumentar los niveles de agua en las presas.

En qué consiste el Aumentar los Niveles de Agua en una presa?
El proceso de aumentar los niveles de agua en las presas abarca múltiples pasos, mismos que actualmente están siendo analizados por el Proyecto de Demostración de Purificación de Agua. Incluye utilizar procesos avanzados de purificación de agua utilizando agua reciclada que podrá mezclarse con los suministros de aguas crudas actuales. El proyecto de Demostración no enviará agua reciclada purificada a una presa local. El concepto de aumentar los niveles de agua en una presa es agregar agua reciclada purificada a una presa local que podrá ser sometido a un tratamiento para cumplir con estándares locales de agua potable y ser distribuida al público.

En qué Consiste el Proyecto de Demostracioń de Purificación de Agua?
El Proyecto de Demostración es la segunda fase del plan de la Ciudad en ampliar el uso de agua reciclada. Este evaluará el uso de tecnología avanzada para la purificación de agua y la factibilidad de producir agua que podrá ser distribuída para mezclarse con agua actual en una presa local. El Proyecto de Demostración incluye un estudio de la Presa de San Vicente, investigación para determinar la alineación con el sistema de conducción, un programa de difusión al publico y la construcción y operación de una instalación avanzada de purificación de agua a nivel piloto.

Es este proyecto "del escusado a la llave" (toilet- to-tap)?
Aunque el uso de "del escusado a la llave" ("toilet- to- tap")el escusado a la llave") ha sido usado en el pasado par describir este proyecto , la descripción no es correcta. La idea que las aguas negras se puedan enviar directamente a la llave de agua potable es errónea tratándose de cualquier proyecto de agua reciclada, ya que deja fuera los pasos claves de tratamiento así como los análisis rigurosos requeridos. En California, todo tipo de agua es altamente regulada y monitoriada para asegurar la salud publica. Ya que no hay nuevas fuentes de agua en el mundo, toda el agua pasa por un proceso natural y básicamente es agua reciclada antes de ser tratada y analisada antes de ser enviada a la llaves de agua. Este proyecto es estrictamente un proyecto de demostración y en ningún momento se enviara agua reciclada a las llaves de agua.

Cual es la tecnología mas avanzada de la purificación de agua ?
La purificación de agua avanzada es un proceso vanguardista que purifica las aguas negras sumamente tratadas hasta lograr un nivel de calidad similar a el de agua destilada. Este proceso incluye filtración por membranas, ósmosis inversa, y la desinfección a través del uso de luz ultra violeta y peróxido. El agua purificada que resulte es de mayor calidad que las fuentes actuales de aguas crudas, y podrá utilizarse como una fuente localmente controlada para incrementar el abastecimiento de agua en las presas.

Es un proceso seguro ell aumentar los niveles de agua en las presas?
Sí. Existen muchos pasos para la protección de la salud pública que deberán cumplirse antes de que el agua reciclada altamente purificada se pueda utilizar en aumentar los niveles de agua en las presas. Un proceso con tecnología de punta en la purificación de agua produce agua que cumple con niveles de calidad de agua destilada. Después de que está agua se envía a la presa, se mezcla con el abastecimiento de agua actual de aguas crudas o no tratadas. Toda el agua que se distribuya a las llaves de agua deberá cumplir con estrictos estándares de agua potable a nivel estatal y federal. El agua es almacenada en depósitos abiertos (lagos) y se procesa a través de una planta de tratamiento de agua potable que elimina todas las sustancias nocivas. Después del tratamiento final, el agua cumplirá con estándares de agua potable antes de que pueda ser distribuida a casas residenciales o negocios. El sistema de tratamiento y conducción de agua se monitorea regularmente para garantizar la seguridad publica.

Se incorporará el agua reciclada a nuestra agua potable ahora?
No. El Proyecto de Demostración analizará las funciones claves mediante las cuales se aumentará el nivel de agua en las presas a pequeña escala y no se enviará agua reciclada a ninguna presa ni se distribuirá a los clientes durante la fase de demostración. La Ciudad operará esta instalación a escala piloto por lo menos durante un año para analizar las operaciones. Al mismo tiempo, un panel asesor independiente integrado por expertos supervisará la investigación del proyecto para determinar si el sistema de tratamiento cumple con todos los requisitos de calidad de agua, seguridad y los reglamentos necesarios para determinar si un proyecto a gran escala sería viable.

Cuáles son las ventajas de aumentar los niveles de agua en los reservorios?
El aumentar los niveles de agua en las presas ofrece maneras de control local, contra sequias el suministro de agua de alta calidad. Si esto es implementado, un proyecto a gran escala, incrementara la utilización de agua reciclada y generara ahorros de energía al reducir la dependencia que San Diego tiene sobre al agua importada. El aumentar los niveles de agua en las presas también podría mejorar la calidad de agua en el Presa San Vicente así como generar un impacto positivo al medio ambiente al producir menos descarga de aguas negras parcialmente tratadas al mar.

Desea mayor información?
El personal de la ciudad quiere llegar con su mensaje al mayor número de sandieguinos y presentarles información sobre el Proyecto de Demostración a su organización.

FAQ

Water Reuse Program

Dự án lọc nước thí điểm
Các câu hỏi thường gặp

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

North City Water Reclamation Plant

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

Thành phố San Diego có cần thêm nước?
Nước là yếu tố không thể thiếu cho chất lượng cuộc sống. Thành phố San Diego nhập khẩu từ miền Bắc tiểu bang California và sông Colorado khoảng 85% đến 90% trong tổng lượng nước cần để cung cấp. Trong vài năm qua, tiểu bang California đã bị ảnh hưởng bởi thời kỳ khô hạn hiếm thấy từ trước đến nay và một đợt hạn hán xảy đến cho sông Colorado. Bênh cạnh đó, những quyết định pháp lý và mang tính bắt buộc để bảo vệ các loài động thực vật đang bị đe dọa tại vùng châu thổ Sacramento - San Joaquin (Sacramento - San Joaquin Delta) đã dẫn đến hạn chế về lượng nước có thể được nhập khẩu từ miền Bắc California. Những thống kê dự đoán về dân số cho thấy Thành phố sẽ cần nhiều nước hơn trong tương lai so với lượng nước được sử dụng hiện nay. Vì San Diego nằm ở khu vực cuối của đường ống dẫn nước nhập khẩu, và có lượng mưa trung bình mỗi năm vào khoảng 10 inch, chúng ta cần phải phát triển tất cả các nguồn cung cấp nước có thể sử dụng được ngay tại địa phương để bảo đảm việc cung cấp nước lâu dài cho dân cư và các doanh nghiệp trong hiện tại và tương lai ở San Diego.

Tại sao chúng ta không thể tiết kiệm nước nhiều hơn (như là một cách để có thêm nước)?
Sử dụng nước ít hơn bằng cách tiết kiệm luôn là bước đầu tiên trong việc bảo vệ nguồn cung cấp nước địa phương của chúng ta. Những chương trình tiết kiệm nước của Thành phố đã giúp giảm sự phụ thuộc của chúng ta vào nước nhập khẩu bằng cách tiết kiệm được hơn 33 ngàn acre-feet (33,000 acre-feet) nước dùng cho sinh hoạt một năm, đủ để đáp ứng nhu cầu sử dụng nước cho một năm của khoảng 66 ngàn hộ gia đình. Tuy nhiên, trong lúc việc bảo tồn nước là quan trọng, những nỗ lực để tiết kiệm nước cần được kết hợp với các chiến lược dài hạn khác để đáp ứng nhu cầu sử dụng nước của San Diego trong tương lai.

Không phải là Thành phố đã sử dụng nước tái chế rồi?
Đúng. Thành phố San Diego điều hành hai hệ thống hiện đại tái xử lý nước có khả năng sản xuất gần 45 triệu gallon nước tái chế một ngày nhằm mục đích phục vụ cho trồng trọt và các hoạt động công nghiệp. Việc phân phối nước tái chế đòi hỏi một hệ thống đường ống dẫn riêng bao gồm những ống màu tím để phân biệt với các đường ống dùng để dẫn nước sinh hoạt. Hệ thống phân phối nước tái chế của thành phố hiện đang tiếp tục được mở rộng. Tuy nhiên, việc sử dụng nước tái chế cho trồng trọt chỉ mang tính mùa vụ; do đó, lượng nước dư được thải ra biển trong suốt những mùa mưa. Xây dựng hệ thống dẫn nước với đường ống màu tím lại tốn kém, do vậy thành phố đang xem xét những phương cách khác để sử dụng được nhiều nước tái chế hơn, trong đó gồm có cả việc tăng lượng nước tích trữ trong hồ chứa.

Thành phố hiện đã có kế hoạch cho việc sử dụng nước tái chế chưa?
Có, Thành phố có một kế hoạch tổng thể về sử dụng nước tái chế và luôn tìm cách để tái sử dụng nguồn nước hiện có. Năm 2005, Thành phố tiến hành một cuộc nghiên cứu tái sử dụng nước chi tiết toàn diện, khách quan, dựa trên các thông số và mang tính khoa học nhằm xem xét tất cả những cơ hội sử dụng nước tái chế. Cuộc nghiên cứu thăm dò đó có cả phần tham gia của công chúng và đi đến kết luận rằng "Kế hoạch gián tiếp dùng lại nguồn nước lưu động" (Indirect Potable Reuse) hay còn được gọi là "Tăng lượng nước được tích trữ trong hồ chứa" là phương pháp ưu tiên để thực hiện quá trình mở rộng việc sử dụng nước tái chế tại San Diego.

THE CITY OF SAN DIEGO

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- more -

Điều gì đã được thực hiện từ khi có cuộc nghiên cứu tái sử dụng nước vào năm 2005?
Cuộc nghiên cứu tái sử dụng nước là giai đoạn đầu trong kế hoạch của Thành phố nhằm mở rộng việc sử dụng nước tái chế. Giai đoạn thứ hai đang được tiến hành để kiểm tra tính khả thi của việc tăng lượng nước tích trữ trong hồ chứa thông qua một dự án thí điểm.

"Tăng lượng nước tích trữ trong hồ chứa" là một quá trình như thế nào?
Việc tăng lượng nước tích trữ trong hồ chứa là một quá trình gồm nhiều bước đang được khảo sát thông qua Dự án lọc nước thí điểm. Quá trình đó bao gồm việc sử dụng các quy trình lọc nước tiên tiến để làm cho nước tái chế có thể pha trộn được với nguồn nước "tự nhiên" hiện có. Dự án thí điểm sẽ không đưa nước tái chế được lọc sạch vào một hồ chứa nào tại địa phương. Khái niệm của quy trình "Tăng lượng nước tích trữ trong hồ chứa" là nhằm đưa thêm nước tái chế sau khi được tinh lọc vào hồ chứa địa phương để có thể được xử lý theo tiêu chuẩn nước sinh hoạt và phân phối cho cộng đồng.

"Dự án lọc nước thí điểm" thực ra là gì?
Dự án thí điểm là giai đoạn thứ hai trong kế hoạch của Thành phố nhằm mở rộng việc sử dụng nước tái chế. Dự án sẽ đánh giá việc sử dụng công nghệ lọc nước tiên tiến và tính khả thi của việc xử lý nước để có thể đưa vào pha trộn với nước hiện có trong hồ chứa địa phương. Dự án thí điểm bao gồm nghiên cứu đánh giá hồ chứa nước San Vicente, nghiên cứu để xác định đường liên kết ống dẫn nước, chương trình tiếp cận cộng đồng nhằm phổ biến thông tin, và xây dựng cũng như vận hành thử nghiệm một hệ thống lọc nước tiên tiến.

Có phải đây là dự án biến nước thải thành nước dùng trong sinh hoạt?
Không, dự án này hoàn toàn là một khảo sát thí điểm và sẽ không có lượng nước tái chế nào được phân phối đến nguồn nước dùng cho sinh hoạt vào bất kỳ thời điểm nào trong quá trình của dự án. Hơn nữa, việc tin rằng nước thải có thể được đưa trực tiếp đến các vòi nước dùng cho sinh hoạt là hiểu biết sai lệch về bất kỳ dự án nước tái chế nào vì nhận định như vậy đã bỏ qua các bước xử lý then chốt và các quy định kiểm tra nghiêm ngặt. Tại California, tất cả các loại nước đều được quy định và giám sát chặt chẽ để đảm bảo độ an toàn. Do không có nguồn nước mới trên trái đất, tất cả các loại nước trải qua một quá trình xử lý theo tự nhiên và được tái sinh một cách tất yếu trước khi được xử lý và kiểm tra thông qua một số quy trình, rồi sau đó được đưa đến các vòi nước dùng sinh hoạt hằng ngày.

Thế nào là "Lọc nước tiên tiến"?
Lọc nước tiên tiến là một quá trình phức tạp về mặt kỹ thuật để thanh lọc kỹ lưỡng nước thải đạt đến chất lượng nước cất. Quá trình này bao gồm xử lý qua màng lọc, thẩm thấu ngược, và khử trùng thông qua việc sử dụng tia cực tím và chất per-oxyt. Nước tinh khiết sau khi xử lý có chất lượng cao hơn nguồn nước "tự nhiên" hiện có và có thể sử dụng như nguồn nước được kiểm soát tại địa phương để tăng thêm nguồn cung cấp nước cho hồ chứa.

Việc tăng lượng nước tích trữ trong hồ chứa có an toàn không?
Có. Có rất nhiều bước bảo vệ sức khỏe cộng đồng phải được thực hiện trước khi nước tái chế được tinh lọc kỹ, có thể được sử dụng để đưa vào hồ chứa làm tăng lượng nước tích trữ. Một quá trình lọc nước dùng kỹ thuật cao sẽ tạo ra nguồn nước có chất lượng như nước cất. Sau khi loại nước này được đưa vào hồ chứa, nó được pha trộn với nguồn nước tự nhiên sẵn có chưa qua xử lý hay còn gọi là nước "thô". Toàn bộ lượng nước được đưa đến các vòi nước phục vụ cho sinh hoạt của người dân phải đáp ứng các tiêu chuẩn nghiêm ngặt về nước uống của tiểu bang và liên bang. Nước được lưu trữ trong các hồ chứa lộ thiên được xử lý qua một nhà máy xử lý nước dùng sinh hoạt nhằm loại bỏ tất cả các chất có hại. Sau bước xử lý cuối cùng, nguồn nước sẽ đáp ứng được tiêu chuẩn của nước uống trước khi nó có thể được phân phối cho các gia đình và doanh nghiệp. Việc xử lý nước và hệ thống phân phối cũng được giám sát định kỳ thường xuyên để đảm bảo độ an toàn.

Có phải nguồn nước tái chế sẽ được bổ sung vào nước sinh hoạt của chúng ta hiện nay?
Không. Dự án thí điểm sẽ kiểm tra các bước vận hành quan trọng của quá trình tăng cường lượng nước tích trữ cho hồ chứa trên một quy mô nhỏ và sẽ không có lượng nước tái chế nào được đưa vào hồ chứa hay phân phối cho người sử dụng trong giai đoạn thí điểm. Thành phố sẽ điều hành một hệ thống thử nghiệm trong vòng ít nhất một năm để phân tích các hoạt động. Đồng thời, một hội đồng tư vấn độc lập bao gồm các chuyên gia cũng giám sát việc nghiên cứu của dự án để xem xét liệu hệ thống xử lý có đáp ứng được các yêu cầu về chất lượng nước, độ an toàn và quy định pháp lý cần thiết để quyết định tính khả thi của toàn bộ dự án đầy đủ các giai đoạn.

Có những lợi ích gì trong việc tăng lượng nước tích trữ trong hồ chứa?
Việc tăng lượng nước tích trữ trong hồ chứa có thể tạo ra một nguồn cung cấp nước chất lượng cao có thể kiểm soát tại địa phương và chống lại hạn hán. Nếu được thực hiện, một dự án hoàn chỉnh với đầy đủ các giai đoạn sẽ làm tăng khả năng sử dụng nước tái chế và tiết kiệm năng lượng bằng cách giảm sự phụ thuộc của San Diego vào nguồn nước nhập khẩu. Tăng lượng nước tích trữ trong hồ chứa cũng có thể cải thiện chất lượng nước ở khu vực hồ chứa San Vicente và có một tác động tích cực đến môi trường nhờ xả ít chất thải hơn ra biển.

Bạn cần biết thêm thông tin?
Nhân viên làm việc cho Thành phố đang tiếp cận với càng nhiều cư dân San Diego càng tốt để trình bày về dự án thí điểm này. Chúng tôi mong muốn được đến tận nơi để cung cấp cho bạn thêm thông tin về việc tăng lượng nước tích trữ trong hồ chứa. Xin vui lòng gọi đến số điện thoại (619) 533-7572 hoặc vào trang web của dự án tại địa chỉ www.purewatersd.org để biết thêm thông tin.

Information (Fact) Card

THE CITY OF SAN DIEGO

Water Purification | Demonstration Project

www.purewatersd.org

Potential benefits of the Demonstration Project

- Provide a local and sustainable supply of high-quality drinking water for San Diego
- Increase utilization of recycled water
- Decrease reliability on imported water
- Provide a supply of water that uses less energy than imported water
- Improve the quality of water in the San Vicente Reservoir
- Have a positive impact on the environment by producing less discharge into the ocean & working toward lower carbon emissions

Did You Know...

1. San Diego needs to develop local, reliable and sustainable sources of water to lessen our dependence on imported water due to multiple factors affecting California's water supply.

2. The Water Purification Demonstration Project is examining the use of advanced water purification technology on high-quality recycled wastewater to determine the feasibility of a full-scale reservoir augmentation project in the future.

3. The water produced by the purification process goes through multiple steps of advanced treatment and will be tested to meet all water quality, safety and regulatory requirements.*

* No purified water will be added to the San Vicente Reservoir or San Diego's drinking water system during the Demonstration Project.

(619) 533-7572

purewatersd@sandiego.gov

City of San Diego PUBLIC UTILITIES Water & Wastewater

Interest and Information Card

The latest version of the card is displayed. Similar cards with varying formatting were developed for events.

Water Purification | Demonstration Project

THE CITY OF SAN DIEGO

City of San Diego PUBLIC UTILITIES Water & Wastewater

INFORMATION CARD

Please check all that apply:

- ☐ I am **interested** in the Water Purification Demonstration Project as a reliable local water source.
- ☐ I would like a project representative to make a **presentation to my organization**.
- ☐ I would like to receive **periodic updates** about the Demonstration Project.
- ☐ I **support** the City of San Diego pursuing the Demonstration Project.

Please send information to:

Name:__________________________ Organization: __________________________

Address: ____

City: __________________________ State: _____________ Zip: _________________

Phone: __________________________ E-mail: _______________________________

purewatersd@sandiego.gov • (619) 533-7572 • www.purewatersd.org

Website

The screenshot is from February 2012 of the home page for the Water Purification Demonstration Project website.

WATER PURIFICATION DEMONSTRATION PROJECT
WEBSITE HOME PAGE (WWW.PUREWATERSD.ORG)

Public Utilities Water

WATER HOME | GENERAL INFO | LAKES AND RECREATION | WATER & SEWER BILL/RATES | WATER CONSERVATION | RECYCLED WATER | WATER QUALITY | CAPITAL IMPROVEMENTS | WATER REUSE

Water Home • Water Reuse • Water Purification Demonstration Project

Water Reuse

- Water Reuse Home
- Water Reuse Study
- Water Purification Demonstration Project
  - News and Publications
  - General Information
  - Public Involvement
  - Independent Advisory Panel
  - Links & Resources
- Full-Scale Reservoir Augmentation

Project Objective

Evaluate the feasibility of using advanced treatment technology to produce water that can be sent to San Vicente Reservoir and later distributed as potable water.

Determine if the Demonstration Project provides evidence of viability for a full-scale IPR/RA project.

The Yuck Factor: Get Over It

Water Purification Demonstration Project

City of San Diego's
Water Purification Demonstration Project
Purification Process

View Larger

As part of the City's water resource strategy, the Water Purification Demonstration Project (PDF) is examining the use of advanced water purification technology to provide safe and reliable water for San Diego's future. The Demonstration Project will determine the feasibility of a full-scale reservoir augmentation project, which would diversify San Diego's water supply, reduce its dependence on imported water and provide a safe source of drinking water for residents.

In an effort to keep San Diegans informed about this important project, free public tours of the Advanced Water Purification Facility are available, as well as project presentations to all interested groups and opportunities to learn more about the project at community events throughout San Diego. For more information, please call (619) 533-7572 or email purewatersd@sandiego.gov.

(No purified water will be added to San Diego's drinking water supply during this demonstration phase.)

PureWaterSD.org

FOLLOW US ON:

TOUR THE ADVANCED WATER PURIFICATION FACILITY

Watch Video of Advanced Water Purification Facility

Watch Video of Huell Howser's California's Water (2010)

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| Recycled Water | Water Quality | Capital Improvements | Water Reuse |

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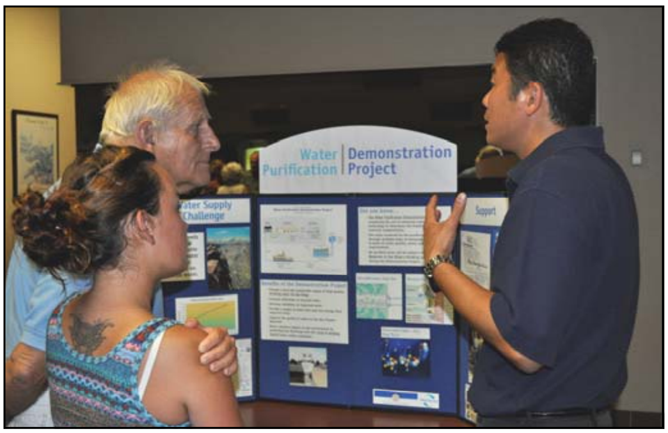
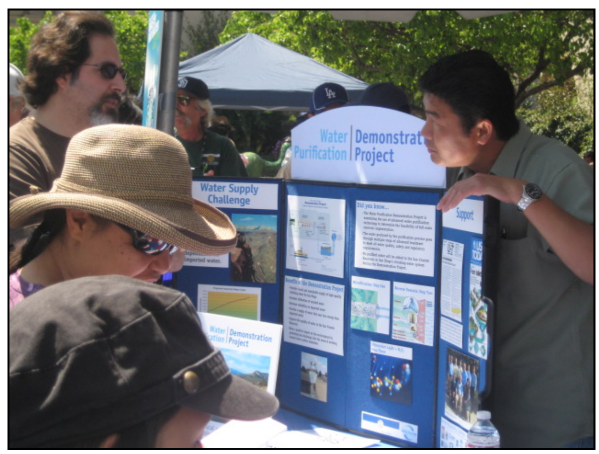
Community Events





Advanced Water Purification Facility Tours

E-Update

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

The City of San Diego's Water Purification Demonstration Project is underway to examine the use of advanced water purification technology on high quality recycled wastewater. The Demonstration Project will determine the feasibility of a full-scale reservoir augmentation project, which would diversify San Diego's water supply, reduce its dependence on imported water and provide a safe source of drinking water for residents.

The San Diego Public Utilities Department invites you to visit the Water Purification Demonstration Project website at www.purewatersd.org to learn more. The project's public education and outreach program is offering informative presentations to all groups upon request and free tours of the Advanced Water Purification Facility following its completion in 2011. For more information, please call (619) 533-7572 or email purewatersd@sandiego.gov.

We hope that you will become informed and get involved in this important project for San Diego's future!

The City of San Diego

City of San Diego PUBLIC UTILITIES Water & Wastewater

Recycled Water

WPDP

In the News

New Source of Drinking Water Hinges on Pilot Project

(PDF)

San Diego Union Tribune, October 11, 2010

City of San Diego Public Utilities Department • Long-Range Planning & Water Resources Division
600 B Street, Suite 600, San Diego, CA 92101 • (619)533-7572 www.purewatersd.org

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The City of San Diego

City of San Diego PUBLIC UTILITIES Water & Wastewater

The City of San Diego | Public Utilities Department

E-Update #2 February 2011

Under Construction

In January, work crews poured the foundation for the new Advanced Water Purification Facility (AWP Facility) located at the North City Water Reclamation Plant. Construction on the testing facility will continue throughout the spring.

Upon completion of the AWP Facility in summer 2011, the City will begin demonstrating advanced purification technology for approximately one year. During the demonstration period, 1 million gallons of purified water per day will be produced. The public will have the opportunity to visit the facility throughout the testing phase. To schedule a tour, please call (619) 533-7572 or email purewatersd@sandiego.gov.

In the News


U-T
THE YUCK FACTOR: GET OVER IT

The Yuck Factor: Get Over It

San Diego Union-Tribune, January 23, 2011

Upcoming Event

The Demonstration Project staff will be hosting an informational booth at the following community event:

San Diego Science Festival - Expo Day
Saturday, March 26, 10 a.m. - 5 p.m.
Petco Park

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E-Update #3 May 2011

Coming Attraction

The City of San Diego opens the doors this summer to its Advanced Water Purification Facility (AWP Facility). Located at the North City Water Reclamation Plant, this facility is part of the City's Water Purification Demonstration Project, which is examining the use of water purification technology on recycled water.

The AWP Facility will operate for one year and will produce approximately 1 million gallons of purified water every day. Purified water will not be added to the drinking water supply during this testing period; it will be added to the existing recycled water distribution system. Members of the public are invited to tour the AWP Facility and see how this technology can transform wastewater into one of the purest sources of water in San Diego.

Keep an eye out for an email in June inviting you to sign up for a tour!

In the News

From Toilets to Tap
USA Today, March 3, 2011

Wastewater Getting New Life Across County
San Diego Union-Tribune, May 15, 2011

Recent Events

The Demonstration Project staff recently hosted informational booths at the San Diego Science Festival Expo Day, Lao New Year Festival, Qualcomm Earth Day Fair, EarthFair, City of San Diego Take Your Son or Daughter to Work Day, Sally Ride Science Festival and RiverFest. Thank you to everyone who visited our booths. We hope to see you at future community events!

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AWP Facility Tour

Dear Danielle,

The City of San Diego opens the doors this summer to its Advanced Water Purification Facility (AWP Facility). You are invited to tour the AWP Facility, where you will see how this technology can transform wastewater into one of the purest sources of water in San Diego. If you are one of the few guests who has already previewed this facility, now is the time to encourage friends and family to register for a tour.

Located at the North City Water Reclamation Plant, this facility is part of the Water Purification Demonstration Project, which is examining the use of water purification technology for San Diego's future water supply. The AWP Facility will operate for one year and will produce approximately 1 million gallons of purified water every day. Purified water will be added to the recycled water distribution system and not to the drinking water supply during this demonstration phase.

Register Today

- Register for a tour of the Advanced Water Purification Facility at www.purewatersd.org/tours.shtml.
- Email purewatersd@sandiego.gov or call (619) 533-6638 to schedule a presentation for your organization.

I hope that you will take advantage of this exclusive opportunity. I look forward to your participation in the AWP Facility tour!

Sincerely,
Marsi A. Steirer
Water Purification Demonstration Project Director
City of San Diego, Public Utilities Department

The Demonstration Project has been funded in part by grants from the U.S. Bureau of Reclamation and from a Proposition 50 grant administered by the California Department of Water Resources.

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THE CITY OF SAN DIEGO

City of San Diego PUBLIC UTILITIES Water & Wastewater

The City of San Diego | Public Utilities Department

Dear Danielle,

As part of sweeps week, ABC affiliate 10 News in San Diego is promoting a segment scheduled to air tonight at 5 p.m. called "Toilet to Tap Reality." If you miss the segment when it airs, it should be viewable online following the broadcast. This segment proposes to examine the process of purifying recycled water at the Orange County Groundwater Replenishment System in relation to how a similar process may eventually be used in San Diego.

Learn More

If you are interested in learning more about water purification in San Diego, call the City's Water Purification Demonstration Project information line at (619) 533-7572 or visit the project website at www.purewatersd.org. An excellent way to learn more about the project is through a tour of the Advanced Water Purification Facility at North City Water Reclamation Plant. Reservations can be made online. Speakers bureau presentations to your organization are also available by calling (619) 533-6638.

For those who want to find out more about what Orange County is already doing for water purification, visit www.gwrsystem.com/.

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City of San Diego PUBLIC UTILITIES Water & Wastewater

Dear Danielle,

Find Us, "Like" Us & Follow Us!

We hope you have been following our project updates on Facebook and Twitter, and now the Water Purification Demonstration Project is sharing videos on YouTube. Please take a moment to subscribe to our YouTube page where you can take a virtual tour of the Advanced Water Purification Facility and see what goes on inside our water purification equipment.

Click the image to view the virtual tour:

Water Purification Demonstration Project

@PureWaterSD

PureWaterSD

Sincerely,
Marsi A. Steirer
Water Purification Demonstration Project Director
City of San Diego, Public Utilities Department

City of San Diego | Public Utilities Department | 600 B Street | Suite 600 | San Diego | CA | 92101

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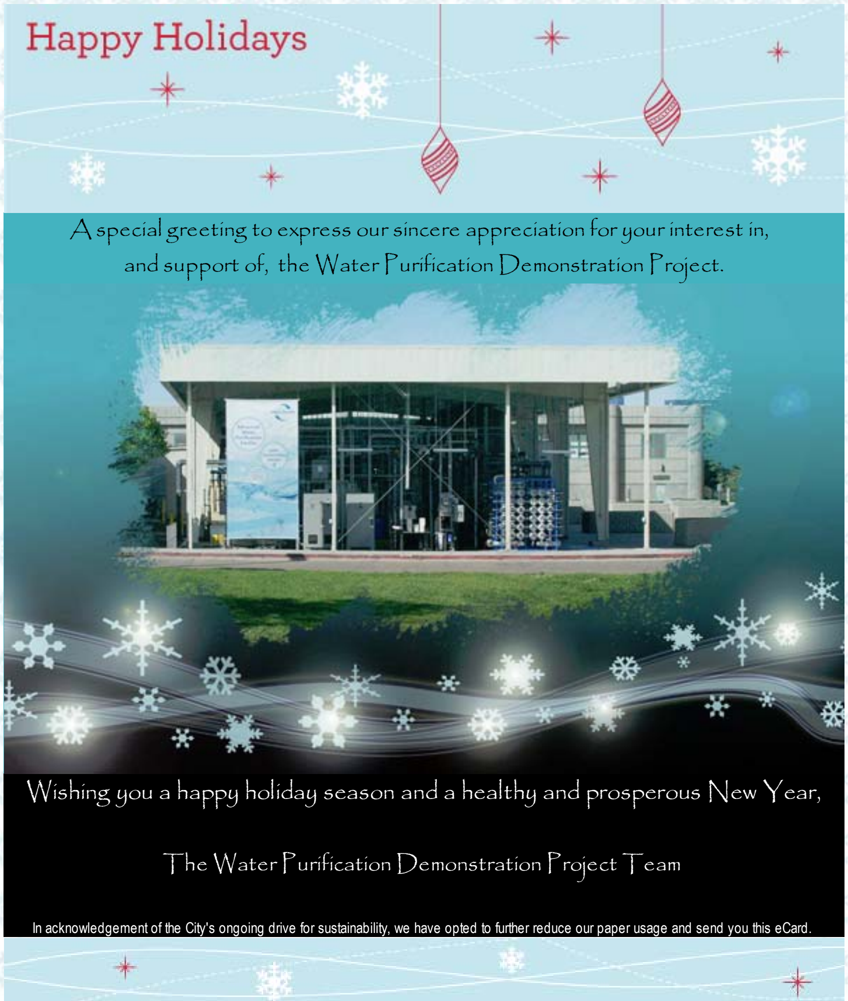

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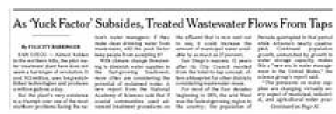
February 2012

Demonstration Project Goes National

First it was USA Today. Then TIME. Now the New York Times has taken notice.

Today's New York Times cover story "As 'Yuck Factor' Subsides, Treated Wastewater Flows From Taps" highlights the nationwide interest in water purification as part of the solution for limited water supplies. The story features San Diego's Water Purification Demonstration Project along with several full-scale projects already in place.



As 'Yuck Factor' Subsides, Treated Wastewater Flows From Taps

The Demonstration Project is exploring the use of advanced water purification technology on recycled water to determine the feasibility of a full-scale reservoir augmentation project in the future. Currently, no purified water is being added to the drinking water supplies; instead the water is being returned to the City's recycled water distribution system.

Read the full story here. Already saw the story? Get involved in the conversation on Twitter and Facebook!

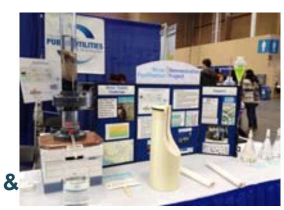
National Research Council Report

Read the latest report from the National Research Council on the expansion of water reuse (the full report and a report in brief are offered on this page):

Water Reuse: Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater

It's All About the Science

SDSA High Tech Fair



Students and other visitors at the San Diego Science Alliance High Tech Fair learned about the water purification process at the Public Utilities Department's informational booth.

San Diego Festival of Science & Engineering EXPO Day

The Demonstration Project team is planning to make another science-related appearance at the San Diego Festival of Science & Engineering EXPO Day in PETCO Park on Saturday, March 24. Be sure to stop by our booth!

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The City of San Diego

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Community Involvement — February 2012

Dear [NAME],

Education and community involvement are at the forefront of our mission to inform San Diegans about the benefits of the Water Purification Demonstration Project. Many community groups and organizations have taken advantage of the project's speakers bureau and nearly 2,000 people have toured the Advanced Water Purification Facility.

To keep members of City of San Diego informed about this important project, we would like to present the Demonstration Project at one of your upcoming meetings and invite you to sign up for a tour. Your group will learn about San Diego's water supply challenges and the City's efforts to pursue locally controlled, sustainable water supply options.

The Water Purification Demonstration Project is examining the use of advanced purification technology on recycled water as an option to supply safe and reliable water for San Diego's future.

Schedule a Presentation

Please call (619) 533-6638 or reply to this email to schedule a presentation.

We are happy to answer any questions you may have, and we hope to speak to your group about the Water Purification Demonstration Project in the near future.

Tour the Advanced Water Purification Facility

In addition to presentations, free tours of the Demonstration Project's Advanced Water Purification Facility are also available. Guests are guided on a walking tour through the water purification facility to view the treatment process and compare samples of water. Interested community members may register for a tour online.

Spread the News

Water issues impact everyone. Share information about the Demonstration Project with City of San Diego. A template article is available for inclusion in your organization's newsletter or community paper. Please email us if you need the document in another format or would like photos to include with the article.

Also available is a flier publicizing the presentations and tours. Please share it with members of your organization.

Wrong Contact?

Although we do our best to update our contact information, we are aware that people often change roles within an organization or leave an organization. If you are not the appropriate person to schedule a presentation or tour, please let us know who we should contact.

Many thanks,
Water Purification Demonstration Project
PureWaterSD.org

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March 2012

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City of San Diego PUBLIC UTILITIES Water & Wastewater

Dear [NAME],

In 2004, you participated in the City of San Diego Water Reuse Study American Assembly Workshops in which participants endorsed reservoir augmentation as the preferred option for developing recycled water sources. In response to the Water Reuse Study, the Water Purification Demonstration Project is underway to examine the use of advanced purification technology on recycled water as an option to supply safe and reliable water for San Diego's future.

Education and community involvement are at the forefront of our mission to inform San Diegans about the Water Purification Demonstration Project. Many community groups and organizations have taken advantage of the project's speakers bureau and nearly 2,000 people have toured the Demonstration Project's Advanced Water Purification (AWP) Facility.

Since you played such a vital role in the Water Reuse Study, we want to ensure you remain informed about the project. Below are some ways for you to remain involved and to share project information with friends and colleagues.

Schedule a Presentation

If you are a member of an organization, **please call (619) 533-6638 or reply to this email** to schedule a presentation.

We are happy to answer any questions you may have, and we hope to speak to your group about the Water Purification Demonstration Project in the near future.

Tour the Advanced Water Purification Facility

In addition to presentations, free tours of the Demonstration Project's Advanced Water Purification Facility are also available. Guests are guided on a walking tour through the water purification facility to view the treatment process and compare samples of water. Interested community members may register for a tour online.

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Also available is a flier publicizing the presentations and tours. Please share it with colleagues, friends and family.

Show Your Support

If you are interested in further supporting water purification, you are welcome to write a letter of support. A sample letter of support can be found here for your reference.

Thank You

We appreciate the time and energy you put into participating in the Water Reuse Study American Assembly Workshops. We hope you remain involved in the Demonstration Project.

Many thanks,
Water Purification Demonstration Project
PureWaterSD.org

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The City of San Diego | Public Utilities Department

April 20, 2012

Dear Danielle,

To celebrate Earth Day on April 22, 2012, the Water Purification Demonstration Project team will be participating in the following community events this weekend:

Linda Vista Multicultural Festival
Saturday, April 21, 10 a.m. - 5 p.m.
Linda Vista Road (between Comstock St. and Ulric St.)

Logan Heights Library Earth Day Event
Saturday, April 28, 11 a.m. - 1 p.m.
Logan Heights Branch Library, 567 S. 28th Street, San Diego

San Diego Earth Fair
Sunday, April 22, 10 a.m.- 5 p.m.
Balboa Park

Please stop by our booth to learn about how the City is examining the use of purification technology to provide a local and reliable source of Earth's most precious resource: water.

We will also be attending the following events next week:
Scripps Research Institute Employee Fair
City of San Diego Take Your Sons and Daughters to Work Day
BD Biosciences Earth Day Event

Upcoming Open House

On Saturday, May 12, the Water Purification Demonstration Project will host an Open House event at the Advanced Water Purification Facility to celebrate Drinking Water Week. A total of six tours will be held every half hour from 10 a.m. until 12:30 p.m. Invite your colleagues, family and friends to join us for a tour, refreshments and givaways. Please register for the event by May 7 at purewatersd.org/tours.shtml.

Learn More

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The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

Dear Danielle,

In case you missed it yesterday, Larry Himmel's Neighborhoods of CBS 8 visited the City of San Diego's Advanced Water Purification Facility. Watch the clip on the CBS 8 website.

Learn More

If you are interested in learning more about water purification in San Diego, visit the project website at www.purewatersd.org.

Experience the project firsthand with a tour of the Advanced Water Purification Facility. Reservations can be made online.

Speakers bureau presentations are also available for organizations by calling (619) 533-6638.

Upcoming Events

Visit the Demonstration Project's informational booths at the following events:

San Diego Horticultural Society meeting
Monday, August 13
6 - 8 p.m.
Del Mar Fairgrounds

New ERAA Back to School Conference, Rally for Education and Festival
Saturday, August 25
1-3 p.m.
Lincoln High School

The Demonstration Project has been funded in part by grants from the U.S. Bureau of Reclamation and from a Proposition 50 grant administered by the California Department of Water Resources.

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One of the greatest joys of this season is the opportunity to say THANK YOU and to wish you the very best for the New Year,

The Water Purification Demonstration Project Team

In acknowledgement of the City's ongoing drive for sustainability, we have opted to further reduce our paper usage and send you this eCard.

Forward email

Pure News

Pure News

Winter 2010

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Welcome to Pure News!

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project. Please invite your friends and colleagues to sign up to receive this newsletter and other project-related updates at www.purewatersd.org.

Do you know where your water comes from?

San Diego is renowned for its sunny skies and ideal climate. What many may not know is that because of the region's semi-arid climate, the City of San Diego has limited local water sources and relies on importing approximately 85 to 90 percent of its water supply each year.

Colorado River

In the past, importing water from the Colorado River and Northern California has been a low-cost, dependable option, but these water sources have become less reliable and more expensive in recent years. Environmental stresses, including the ongoing drought in the Colorado River basin and reduced snow pack and runoff in Northern California, have decreased the available water supply. In addition, court-ordered pumping restrictions to protect threatened fish species have severely reduced the amount of water that can be delivered by the California State Water Project. This has a significant effect on San Diego, which sits at the end of the various pipeline systems that deliver the imported water. These conditions have intensified the need to identify new, locally controlled water sources.

To address this critical water supply situation, the City is actively pursuing ways to diversify San Diego's water supply options. One of these options is water conservation. The City declared a Level 2 Drought Alert in effect as of June 2009, which enforces many mandatory water restrictions and water conservation practices. Water customers in the City of San Diego have done a great job from July 2009 to June 2010, reducing water use by 11.6 percent compared to July 2008 to June 2009. Although conserving water is an important aspect of the City's water supply initiative, conservation alone is not enough. Therefore, the City is implementing a three-phase Water Reuse Program to explore local solutions for San Diego's future water supply reliability.

Sacramento–San Joaquin Delta

As the City continues to diversify San Diego's water supply portfolio and increase the amount of water available to us in the future, efforts are focused on providing information about the water supply to residents of San Diego. To learn more about the City's current water supply situation, drought conditions, conservation practices and water reuse options, please visit www.sandiego.gov/water.

Water Purification | Demonstration Project

Did you know...

Why can't we just conserve enough water to meet future needs?

Using water wisely through conservation practices should always be the first step in preserving the City's precious water supplies. The average water demand (which includes local surface water, imported water, conservation and recycled water) for the City of San Diego for the last six fiscal years has been approximately 260,000 acre-feet per year. The City's conservation programs have helped reduce its dependence on imported water by saving more than 34,000 acre-feet of drinking water a year. That's enough water to meet the needs of 68,000 average families of four for one year. Nonetheless, by 2030 the City will need an additional 43,000 acre-feet of water per year to meet the needs of current and future water customers. So while conservation is important, efforts to save water need to be combined with other sustainable strategies if we are to have enough water for all of our needs.

A look at new, local options for water

Today, the majority of San Diego's water supply comes from imported sources that are becoming more expensive and less reliable. In 2004, the City launched a three-phased Water Reuse Program (Program) to address the water supply crisis by exploring local solutions for future water supply reliability.

Phase one of the Program was the City's 2005 Water Reuse Study (Study). The Study provided a comprehensive evaluation of all viable options to maximize the use of recycled water produced by the City's two water reclamation plants. In addition, the Study analyzed and researched the health effects of various water reuse options. The Study concluded that reservoir augmentation at the City's San Vicente Reservoir is the preferred option for maximizing the use of the City's recycled water supply. Reservoir augmentation is a multi-step process that includes sending the advanced purified water to a reservoir to blend with existing water supplies and then treating the blended water again to be distributed as drinking water. A broad-based group of City residents participated in an American Assembly process to review the Study findings. The American Assembly reached the same conclusion that reservoir augmentation was the most viable use of highly treated recycled water for San Diego and that it could provide a local, reliable supply of water crucial to the City's future.

San Vicente Reservoir

Based on the final draft report that summarized the Study results, the San Diego City Council commissioned the second phase of the Program: the Water Purification Demonstration Project (Demonstration Project). The purpose of this phase is to further explore the option of reservoir augmentation by demonstrating the project on a small scale. The Demonstration Project, which is currently underway, is examining the use of advanced water purification technology to purify highly treated recycled wastewater that could potentially be added to the "raw" water (water prior to being treated) in a local reservoir. During this testing phase, purified water will not be added to the drinking water supply.

An Advanced Water Purification Facility (AWPF) is being built in Sorrento Mesa, a community in the northern region of the City, and will operate for about one year to produce approximately 1 million gallons of purified water per day. A study of the San Vicente Reservoir is also being conducted to test the key functions of reservoir augmentation and an independent advisory panel of experts is providing oversight on project research. The research will determine if the purification system satisfies all water quality, safety and regulatory requirements of the California Department of Public Health, and what will happen if the purified water is added to the reservoir. The Demonstration Project is scheduled to conclude at the end of 2012.

If the Demonstration Project meets regulatory requirements and provides evidence that a full-scale project would be viable, the mayor and city council will decide whether to implement a full-scale reservoir augmentation project. This would potentially be the third and final phase of the Water Reuse Program. In this potential phase, the advanced treated water would be added to the San Vicente Reservoir. The blended water from the reservoir would go to the Alvarado Water Treatment Plant where it would be treated for potable use. This water would become part of the drinking water supply for the City of San Diego.

Visit www.purewatersd.org to learn more about the Demonstration Project.

Did you know...

Doesn't the City already recycle water?

Yes. The City of San Diego operates two water recycling facilities capable of treating 45 million gallons per day of wastewater to secondary and tertiary treatment levels. Recycled water treated to a secondary level is safe for distribution into the environment, while recycled water treated to a tertiary level undergoes further treatment so the water is safe for use in irrigation and industrial purposes.

The recycled water produced by these plants is primarily used for irrigation and industrial purposes. A separate distribution system of "purple pipes" is required to keep the recycled water separate from drinking water pipelines. Constructing additional purple pipe distribution systems is costly. Also, using recycled water for irrigation is seasonal – it is not used in rainy periods or when it is cooler. This means less than half of all wastewater available for recycling is beneficially reused. The remainder of recycled water is treated to a secondary level and discharged into the ocean. Because of the cost and the limited use of existing recycled water, the City is examining other ways to use more recycled water, including reservoir augmentation.

Demonstrating Advanced Water Purification Technology

A key component of the Demonstration Project is the Advanced Water Purification Facility (AWPF). Construction on the AWPF will begin in early 2011. Following testing, the AWPF is expected to be operational in spring 2011.The facility will be located at the North City Water Reclamation Plant and will be the centerpiece of the Water Purification Demonstration Project.

The AWPF is very different from a wastewater treatment facility. First, the water entering the AWPF has already been "reclaimed" through a series of treatment processes. At the North City Water Reclamation Plant, sewage is screened multiple times before being chemically treated to a safe level for discharging into the environment. After these treatment steps the wastewater is considered recycled water and is safe enough to be used for all irrigation and industrial purposes.

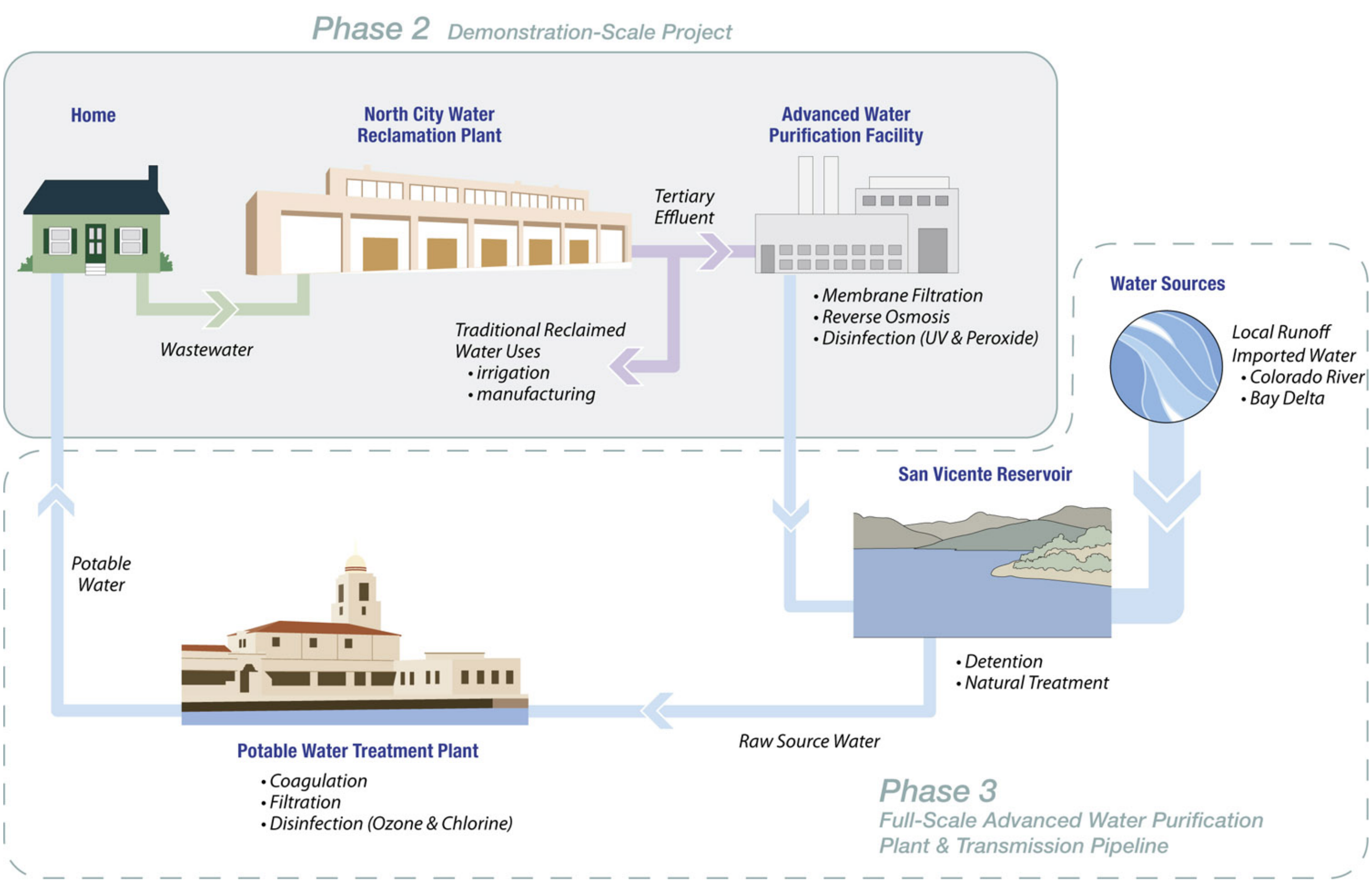

North City Water Reclamation Plant

At the AWPF, the City will start with recycled water and, using advanced water purification technology, will purify it to a level equivalent to distilled water. Advanced water purification technology includes membrane filtration, reverse osmosis, and disinfection by ultraviolet light and hydrogen peroxide. The resulting purified water is of higher quality than any of the City's existing raw water supplies.

The AWPF will produce approximately 1 million gallons of purified water per day for about a year. During the demonstration phase, the water produced at the facility will be used for irrigation, the same way the existing recycled water is used. It will not be added to the existing drinking water supply during the demonstration phase.

Free tours of the AWPF will be offered to the public when construction is complete. Details will be posted on www.purewatersd.org as the facility completion date nears.

City of San Diego's
Demonstration Project
Water Purification Demonstration Process



Community Involvement

A major component of the Water Purification Demonstration Project is an extensive public education and outreach program that is being implemented throughout the City of San Diego. This program includes public presentations, the distribution of information at community events and on the project website, and tours of the AWPF once it is completed in the spring of 2011.

Since its launch in July, the Demonstration Project speakers bureau has been actively seeking opportunities to make presentations to civic, business and community groups as a way to engage the public and gather feedback on project information. Information about the project is presented by a member of the City's Demonstration Project team and includes information about San Diego's need for a local and reliable water supply, the purpose of the Demonstration Project, a description of the advanced water purification process, and the potential use of advanced purified water for reservoir augmentation in the future. Presentations are followed by an opportunity to ask questions or focus on an area of interest to a particular group.

To schedule a presentation for your organization or business, please contact the speakers bureau at (619) 533-6638 or email purewatersd@sandiego.gov. A calendar of upcoming presentations that are open to the public is available on the project website, which also includes more detailed project information and a list of past presentations.

Upcoming Events

Learn more about the Demonstration Project at one of the following community events. Project team members will be present to answer questions about the project and to share the latest project news.

13th Annual San Diego Multicultural Festival
Martin Luther King Jr. Promenade
(Downtown San Diego along Harbor Drive
across the street from the Convention Center)
Saturday, Jan. 15
www.ccdc.com

6th Annual San Diego Lunar New Year
Tet Festival 2011
Balboa Park
Saturday, Jan. 29
www.sdtet.com

Stay tuned for tours of the
Advanced Water Purification Facility
beginning in Spring 2011

North City Water Reclamation Plant

THE CITY OF SAN DIEGO

PureWaterSD.org

Visit our project website to sign up for email versions of Pure News and to keep informed about this important project.

City of San Diego PUBLIC UTILITIES Water & Wastewater

Pure News

Spring 2011

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

Pure News: Issue 2

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project.

Why rain isn't enough

Every winter after a storm, you hear the same question: with all this rain, why doesn't San Diego have enough water?

The answer is related to San Diego's climate and population. From year to year, San Diego's rainfall is anything but dependable. In the past decade, rainfall in the City of San Diego has been as low as 4 inches to as high as 14 inches, which is not enough to meet the demands of San Diego's population. Since rainfall is so varied, so is runoff into the City's nine reservoirs where raw water is stored. Lower Otay Reservoir, the City's oldest, has records dating back more than 100 years, which tell the story of San Diego's water runoff challenges. Years go by with little runoff – some years none at all – and then there are wet years that fill the reservoir with water, followed again by very dry years.

"Normal rainfall in the San Diego region can range from very dry to very wet," said Jeff Pasek, San Diego Public Utilities Department Watershed Manager. "If you look at the records of rainfall and runoff over the years, you'll see extremes in fluctuation. We can't count on any certain amount of rainfall."

The situation is exacerbated by the City's ever-growing population. San Diego's system of local reservoirs was built from about 1900 to 1950. These reservoirs amply supplied San Diego through the first half of the last century, but because of population growth, the demand for water has quadrupled over the last 60 years. San Diegans have diligently conserved water over the past 20 years, steadying the water demand despite continued population growth. Nevertheless, even if rainfall in the San Diego region was consistently above average, the local runoff would not be enough to sustain the City.

Even in a wet year, natural runoff accounts for a small percentage, roughly 15 percent, of San Diego's annual water supply; the rest has to be imported. Countywide, the

Continues on Page 3

Did you know...

Does San Diego need more water?

The City of San Diego imports approximately 85 percent of its water supply from Northern California's Bay-Delta and the Colorado River. For the past few years, California has been affected by a historic dry period and a drought on the Colorado River. Legal and regulatory decisions to protect endangered species have resulted in restrictions on the amount of imported water from Northern California. Population projections predict the City will need more water in the future than is used today. For all of these reasons, the City needs to develop local water supplies to secure a reliable supply for present and future City of San Diego water customers.

AWPF construction begins!

In January, work crews poured the foundation for the new Advanced Water Purification Facility (AWP Facility) located at the North City Water Reclamation Plant. Construction on the testing facility will continue throughout the spring.

The Advanced Water Purification Facility's canopy is now installed.

Ahrens Corporation completed construction on the concrete pad for the AWP Facility in January 2011. The facility canopy, which will cover the advanced water treatment equipment, was completed in late February.

Upon completion of the AWP Facility this summer, the City will begin testing advanced purification technology for approximately one year. During the demonstration period, 1 million gallons of purified water per day will be produced. Concurrently, the San Vicente Reservoir is being studied to examine the viability of adding the advanced purified water to the reservoir to augment drinking water supplies. Other studies, including cost analysis, will be completed at the same time. Together these studies and tests will determine if the project concept is feasible for full scale.

In the community

If you've been to a community event recently, there's a good chance the Water Purification Demonstration Project was there, too. Beginning in early 2011, the Demonstration Project team staffed informational booths at several community events.

In January and February, the Demonstration Project staff teamed up with the City's Conservation team to reach out to San Diegans with important messages about water at the San Diego Multicultural Festival, the San Diego Lunar New Year Tet Festival and the San Diego Chinese New Year Food and Cultural Fair. In February and March, the Demonstration Project team struck out on their own to participate in the Heritage Weekend Festival and the San Diego Science Festival Expo Day.

Guests visit the Demonstration Project booth at the Tet Festival.

Hundreds of passersby stopped by the booth to learn more and ask questions about the Demonstration Project. Staff explained the details of the project and provided fact sheets to them. After learning about the project, these visitors were invited to spin the prize wheel for a chance to win the Demonstration Project's highly coveted reusable tote bag. Many interested participants (including some of you who are reading this right now) signed up to receive email updates about the project.

"By participating in these events, we are able to talk to a wider variety of San Diegans, not just those who have an interest in water issues," said Alma Rife, Public Information Officer for the Demonstration Project. "These events have been great opportunities to share information about the Demonstration Project and eliminate misinformation and confusion about it."

In April and May, the Demonstration Project staff will be at the Lao New Year at Market Creek Plaza on Saturday, April 2, and the EarthFair in Balboa Park on Sunday, April 17. Hope to see you there!

Why rain isn't enough *(Continued from Page 1)*

portion of water supply from local runoff is even lower. This supply is not only low because of the fluctuating amount of rainfall, but also because San Diego's watersheds extend less than a thousand square miles from the western slopes of our mountains to the coastal plain. When compared to the watershed of the Colorado River – hundreds of thousands of square miles in seven states with the snowcap of the Rocky Mountains draining into it – the San Diego watersheds are not a very big area to capture water.

When San Diego does get rain, most of the rain runoff in the region occurs in the back country and mountains, and flows down streams to be captured in reservoirs. San Diego's reservoirs are sized and situated to capture almost all of the runoff that's available from rain events. If all the reservoirs are full, they can hold nearly two years' worth of water supply for the City. Just this winter, Barrett and Hodges reservoirs received so much runoff they filled and overflowed into the ocean. However, because major rainstorms are infrequent, the reservoirs are not often full or even close to full. In fact, the last time all of San Diego's reservoirs were completely full was 1983.

Compared to cities that sit next to the Great Lakes, the Mississippi River or atop massive aquifers, San Diego's water supply has always been rather precarious. That's part of life in Southern California. Rainfall is iffy, rivers are scanty, watersheds are small, reservoirs are few and groundwater is limited. Since San Diego cannot depend on local rainfall, the City must depend on importing about 85 percent of its water supply. As imported supplies become more expensive and less reliable, it is time to diversify San Diego's local water sources to supplement the small supply produced by the rain.

Treating water right: Part I

When it comes to wastewater treatment, there is no "one-size-fits-all" approach. In fact, there are several levels for "cleaning" wastewater. Regulatory requirements determine which level of treatment the wastewater will undergo: primary, secondary or tertiary treatment. Tertiary treated water is considered "recycled water" and can be used for many applications.

Point Loma Wastewater Treatment Plant

At San Diego's Point Loma Wastewater Treatment Plant, sewage goes through what is called "advanced primary treatment." In this process, water is separated from grit or large particles. Following grit removal, the wastewater is pumped into sedimentation tanks. With the assistance of chemical treatment, solids or "primary sludge" settle to the bottom of the tanks and "scum" (primarily cooking grease and oil) float to the surface. At this point, approximately 80 percent of the suspended solids have been removed. The waste is separated from the water and is disposed offsite. After a final screening, the treated wastewater is discharged from the Point Loma Wastewater Treatment Plant through a long pipeline 4.5 miles out into the ocean.

Wastewater may continue on to secondary treatment. If this occurs, bacteria are added to the wastewater. Air is pumped into this mixture, and the bacteria ingest and digest the organic solids. Next, the wastewater is pumped into secondary clarifiers,

Continues on Page 4

Terms to Know

Potable Water: Water that has been treated to drinking water standards. This is the water delivered to consumers' taps.

Raw Water: Water from rain, snow, rivers, and lakes/reservoirs that has not been treated at a drinking water plant.

Storm Water: Urban runoff water from rainfall and irrigation. In most of San Diego, this water is untreated and flows into creeks, bays, lagoons, and ultimately the ocean.

Wastewater: Water collected in the sewer system from residences and business. It is mostly water with some impurities.

Treating water right *(Continued from Page 3)*

North City Water Reclamation Plant

where the bacteria and digested solids settle to the bottom as "secondary sludge." Similar to primary treatment, the sludge is removed for further treatment, and the treated wastewater can either be moved along to tertiary treatment to produce reclaimed water or may be discharged.

After going through primary and secondary treatment processes, tertiary-treated wastewater is produced by filtering to remove any remaining solids, chlorination to disinfect, and demineralization to reduce the amount of salt in the water. The resulting product is known in California as "recycled water." Recycled water produced at the North City Water Reclamation Plant is safe for industrial uses and outdoor irrigation.

Water treatment doesn't end there. Stay tuned because in the next Pure News we will talk about how recycled and raw water can go through additional treatment steps.

Schedule a presentation for your group or organization
Contact the speakers bureau at (619) 533-6638 or email purewatersd@sandiego.gov.

Upcoming Events

Learn more about the Demonstration Project at one of the following community events. Project team members will be present to answer questions about the project and to share the latest project news.

Lao New Year
Market Creek Plaza
(310 Euclid Avenue, San Diego, 92114)
Saturday, April 2
10 a.m. - 6 p.m.
www.LCCCSD.com

EarthFair
Balboa Park
Sunday, April 17
10 a.m. - 5 p.m.
www.earthdayweb.org/

Coming soon:
Tours of the Advanced Water Purification Facility.
Watch for an email in the coming months.

North City Water Reclamation Plant

THE CITY OF SAN DIEGO

PureWaterSD.org

Visit our project website to sign up for project updates.

City of San Diego PUBLIC UTILITIES Water & Wastewater

Pure News

Summer 2011

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Pure News: Issue 3

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project.

Get a Glimpse of the Future at the Advanced Water Purification Facility

The City of San Diego opens the doors this summer to its Advanced Water Purification Facility (AWP Facility). Starting in June, groups and individuals can tour the site of a small-scale, state-of-the-art treatment facility that could contribute to the future of San Diego's water supply. This facility, located at the North City Water Reclamation Plant, represents the focal point of the City of San Diego's Water Purification Demonstration Project (Demonstration Project). It has been under construction since early 2011.

Here visitors will learn about the advanced technologies being demonstrated by the City to purify one million gallons of recycled water per day. The purification process employs three treatment methods: microfiltration/ultrafiltration, reverse osmosis, and advanced oxidation with ultraviolet disinfection and hydrogen peroxide. More simply put, the AWP Facility is demonstrating the purification of water using technology that is able to produce one of the most pristine sources of water available anywhere.

Visitors will learn how such purity is established through this multi-barrier approach of consecutive treatment steps, which work together to remove or destroy all unwanted materials in the water. Each barrier includes frequent, continuous water quality monitoring and safeguards built into the process to ensure that an error at any given treatment step is caught and corrected to protect public health.

Why here, and why now? California's water supply is subject to climate variations, droughts and regulatory restrictions, all of which affect the amount of water delivered to San Diego at the end of the pipelines that carry water imported from hundreds of miles away. The City needs to develop local, reliable sources of water to lessen its dependence on imported supplies. The Demonstration Project is exploring this proven technology that is already used to produce purified water for a full-scale project in Orange County.

With this effort, the City of San Diego joins other cities and water agencies throughout the United States and around the world, standing on the leading edge of water technology. Visitors will end their tour of the AWP Facility with a better understanding of the promise of these technologies to help ensure a drought-proof water supply independent of less reliable and constrained imported water sources.

Water Purification | Demonstration Project

About the Tours

Guests who participate in the AWP Facility tour will gain a better understanding of the Demonstration Project and what role the facility plays in this testing phase.

Following an introductory presentation, guides will lead a walking tour through the facility. Guests will see the microfiltration/ultrafiltration, reverse osmosis and UV disinfection/advanced oxidation equipment up close. At the end of the tour, guests can view the purified water produced at the facility and will have a chance to compare it to drinking water and recycled water samples.

To register for a tour, visit www.purewatersd.org/tours.shtml. If you would prefer to schedule a presentation for your organization, email purewatersd@sandiego.gov or call (619) 533-6638. We hope you will take advantage of this unique opportunity to visit the AWP Facility.

The Urban Water Cycle

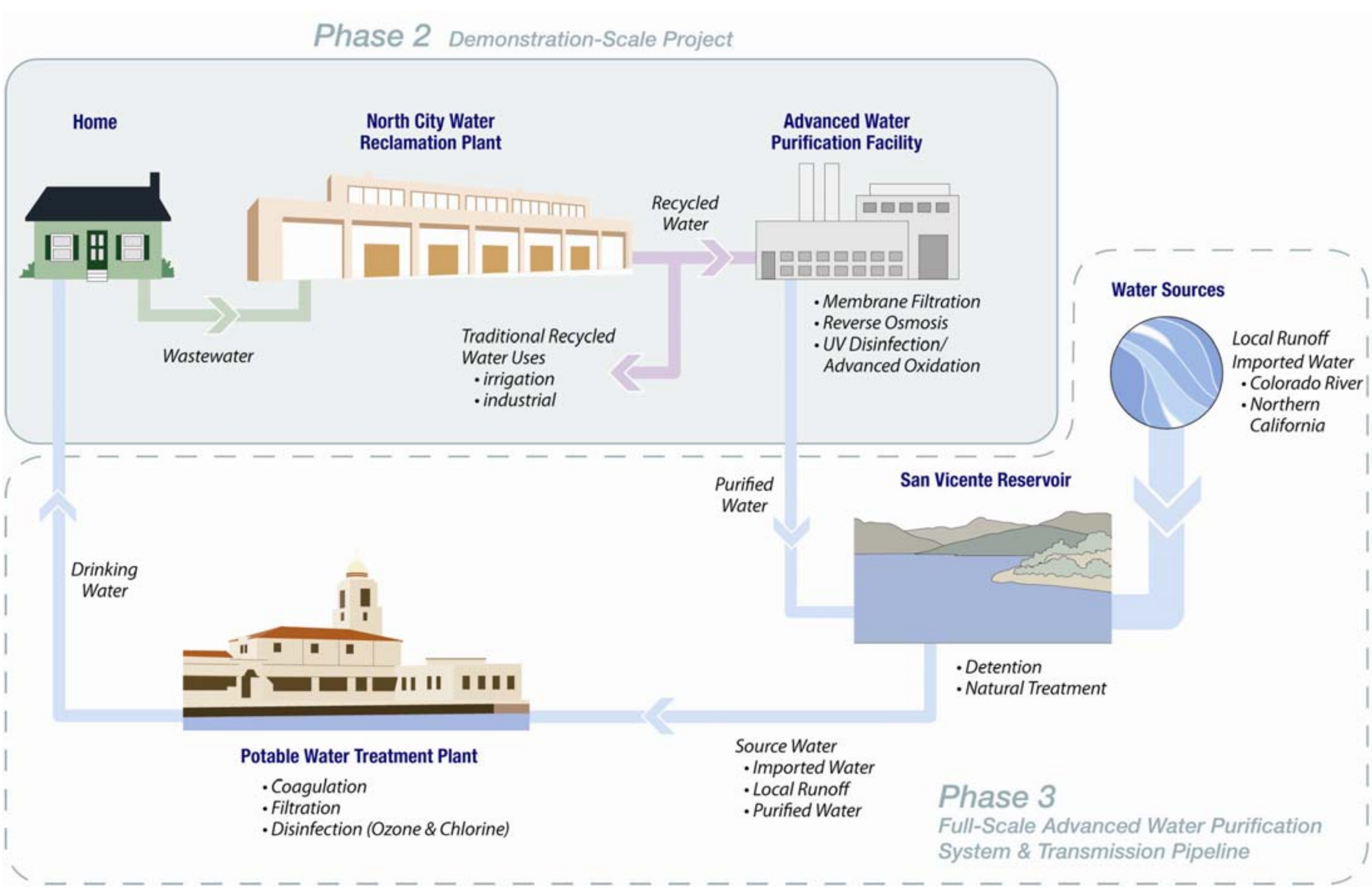
When we think back to our fourth grade science lessons about the natural cycle of water, it becomes clear that all water is as old as the Earth itself. This means that all water is naturally recycled - including the water we drink. The urban water cycle is a similar, man-made system that works to create the continuous movement of water to import and export our local supply of one of the Earth's most precious resources: water.

Modern technology has enhanced the urban water cycle with the ability to clean up and recycle the water we use. Recycled water can be treated to various levels for use in irrigation and manufacturing, and the most advanced water treatment can purify recycled water for drinking. This technology can be especially beneficial in a city like San Diego that has limited local water sources and relies on importing approximately 85 percent of its water supply.

San Diego's urban water cycle features multiple water treatment facilities that make up an extensive treatment system that water travels through before reaching your faucet. Water treatment plants, such as the Alvarado Water Treatment Plant, provide drinking water treatment. The treated water is then distributed to residents and businesses all over the City.

The Point Loma Wastewater Treatment Plant handles wastewater treatment and disposal for the City of San Diego. In addition to this wastewater treatment plant, the City has two wastewater reclamation plants: the North City and South Bay water reclamation plants. Instead of simply disposing treated wastewater, these plants treat the wastewater even further to produce recycled water. Recycled water is distributed through designated "purple pipes" and is used for irrigation and industrial purposes.

The newest member of San Diego's urban water cycle is the state-of-the-art Advanced Water Purification Facility (AWP Facility) that purifies the recycled water produced at the North City Water Reclamation Plant. The AWP Facility is demonstrating the latest in water purification technology as part of the Water Purification Demonstration Project. The outcome of the Demonstration Project will determine whether or not the City will close the loop on its urban water cycle to provide a source of purified water to supplement drinking water supplies. In a world where water reuse is inevitable and water purification technology is available, enhancing the urban water cycle is the key to a sustainable future.



Permanent Water-Waste Restrictions Still in Place
New Watering Times Started June 1

When the San Diego City Council approved Mayor Sanders' proposal in May to end mandatory water-use restrictions, the move did not affect several water-waste restrictions that remain permanent year-round. Water-waste restrictions refer to City restrictions on wasteful water use. Starting on June 1, one of the permanent restrictions--the timing for when landscape watering is allowed -- shifts to after 6 p.m. and before 10 a.m.

"San Diegans have done a tremendous job by saving water when we were faced with mandatory cutbacks," said Mayor Jerry Sanders, who has demonstrated both at home and at work that water conservation is a priority. "While the drought may be officially over, waste is never an option. Using water wisely throughout the year needs to remain a permanent way of life," added Mayor Sanders.

The City's permanent water-waste restrictions also address issues such as excessive irrigation, washing

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Treating water right: Part II

Terms to Know

Drinking Water:
Water that has been treated to federal and state drinking water standards. This is the water delivered to consumers' taps. Also called potable water.

Raw Water:
Water from rain, snow, rivers, lakes, and reservoirs that has not been treated at a drinking water plant. San Diego's raw water is primarily imported from sources such as the Colorado River or collected in the City's reservoirs from rainfall.

Recycled Water:
Wastewater that has undergone a high level of treatment at a reclamation facility so that it can be reused for irrigation and industrial purposes.

Storm Water:
Urban runoff water from rainfall and irrigation. In most of San Diego, this water is not treated and flows into creeks, bays, lagoons, and ultimately the ocean.

Wastewater:
Water collected in the sewer system from the drains of residences and business. Wastewater is more than 99% water along with impurities.

In the Spring 2011 edition of Pure News, we explained the process for treating wastewater. In this edition, we will focus on drinking water treatment.

Since approximately 85 percent of the City of San Diego's drinking water is imported from unreliable and increasingly expensive sources, San Diego is considering purification of recycled water to develop a new, local source of drinking water. Through the Water Purification Demonstration Project (Demonstration Project), the City is demonstrating water purification technology that purifies recycled water even further. This technology includes membrane filtration, reverse osmosis, and disinfection through the use of ultraviolet light and hydrogen peroxide. The resulting purified water is of higher quality than our imported water and local runoff. During this demonstration phase, the water produced at the AWP Facility will not be added to any drinking water supplies, but will instead be added to the recycled water system. If the concept proves feasible and is approved by the City Council, the City would then build a full-scale water purification project to blend purified water with raw water in San Vicente Reservoir.

Alvarado Water Treatment Plant

All of San Diego's drinking water, which includes water from San Vicente Reservoir, undergoes drinking water treatment. This is the final step of treatment before arriving at the tap. At the water treatment plant, any particles are removed and contaminants are eliminated through the combined processes of flocculation, sedimentation, filtration, chlorination and ozonation. Before the water is sent to homes and businesses around San Diego, it is tested to make sure it meets all health and safety requirements set forth by the U.S. Environmental Protection Agency and the California Department of Public Health. Thanks to these behind-the-scenes treatment processes, San Diegans can dependably turn on their faucet for reliable, clean water.

Learn more about water sources, treatment and distribution at "Source to Tap" (www.sandiego.gov/water/quality).

Permanent Water-Waste Restrictions Still in Place *(Continued from Page 3)*

down sidewalks and patios, overfilling swimming pools and using re-circulating pumps on decorative fountains. Additional restrictions pertain to car washing, cooling systems and hospitality industry water use. To help customers eliminate water waste, the City's Public Utilities Department offers a number of programs and services, providing the tools needed to save water and money. Some examples include the following:

- Free residential and commercial water surveys through the Public Utilities Department can pinpoint water-saving options at your home or business, including identifying possible leaks. Call (619) 570-1999, email water@sandiego.gov or visit the City's website.
- Citizens can play an important role in preserving our water and maintaining our water system by reporting any water leaks. Water loss is often caused by leaks from service lines, main breaks and fire hydrants knocked over by a vehicle. The City counts on residents to help proactively identify and report all types of leaks or other problems on the City water system. To report leaks, call the City's 24-hour emergency hotline at 619-515-3525.
- Customers are also encouraged to report water waste. Just send the City the location, date and time the waste was observed. Customers can provide their contact information for follow-up questions or remain anonymous. Either send an email to waterwaste@sandiego.gov or call (619) 515-3500 (press 5) or (619) 533-7485.

For more information on the City's permanent water-waste restrictions and a comprehensive listing of available conservation resources and tips, visit WasteNoWater.org or call the Public Utilities Department at (619) 515-3500.

Upcoming Event

Learn more about the Demonstration Project at the following community event. Project team members will be present to answer questions about the project and to share the latest project news.

Fiesta del Sol
Cesar Chavez Park on San Diego Bay
Saturday, August 13
11 a.m. - 7 p.m.
www.fiestadelsolsandiego.org/

To schedule a presentation for your organization, email purewatersd@sandiego.gov or call (619) 533-6638.
Visit www.purewatersd.org/tours.shtml to sign up for a tour of the AWP Facility.

Not receiving email updates from the Demonstration Project? Sign up at www.purewatersd.org or email purewatersd@sandiego.gov.

THE CITY OF SAN DIEGO

PureWaterSD.org

Visit our project website to sign up for project updates.

City of San Diego PUBLIC UTILITIES Water & Wastewater

Pure News

Water Reuse Program

Water Purification Demonstration Project

Fall 2011

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

Pure News: Issue 4

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project.

A new site to see in San Diego

San Diego Mayor Jerry Sanders, Councilmember David Alvarez, Public Utilities Director Roger Bailey, and Water Purification Demonstration Project Director Marsi Steirer welcomed media to the AWP Facility on June 30.

Since the Advanced Water Purification (AWP) Facility opened for tours in July, City staff has hosted more than 102 tours for approximately 1,200 people. The City is pleased to welcome community members and others who have toured the AWP Facility. People from all over San Diego have visited and many guests bring their family, friends and co-workers. Various groups from graduate school classes to the Audubon Society to senior citizen organizations to a fifth grade science class have toured the facility. It's not just local folks who visit, though. Because many countries around the globe are interested in water purification technology as a potential solution to water supply issues, international visitors have come all the way from Mexico, Vietnam, Australia and Eurasian countries.

In early July, elected officials, water agency boards, and community group representatives were among the visitors. Elected official visitors include San Diego Mayor Sanders, San Diego Councilmembers Alvarez, Faulconer, Gloria, and Lightner, and the mayors of Del Mar and Solana Beach. In addition, staff from the offices of U.S. Senator Boxer, U.S. Representative Issa, State Senator Anderson, and Assemblymember Jones have also toured the facility. Staff from the San Diego Regional Water Quality Control Board, California Department of Health, U.S. Bureau of Reclamation, U.S. Environmental Protection Agency, U.S. Department of the Interior, and the U.S. Office of Management and Budget have also visited.

Students from the Elementary Institute of Science compare beakers filled with tap, recycled and purified water.

If you haven't already, we hope you will tour the AWP Facility by registering at www.purewatersd.org/tours.shtml. If you can't make it out to the facility, you can watch a video about the purification process online at www.purewatersd.org. Another option to learn more about the Demonstration Project is to schedule a speaker's bureau presentation for your group or organization by calling (619) 533-6638 or emailing purewatersd@sandiego.gov. Through these and other methods, the City wants to provide opportunities for San Diegans to learn more about the water purification process.

City of San Diego Water and Wastewater Treatment Facilities

Drinking Water Treatment Plant:

Alvarado, Miramar, & Otay Water Treatment Plants

Cleans water from rain, snow, rivers, lakes, and reservoirs to a level safe for drinking. The water from these plants is then sent to faucets around San Diego.

Wastewater Treatment Plant:

Point Loma Wastewater Treatment Plant

Treats wastewater from homes and businesses and releases the cleaned wastewater into the ocean.

Water Reclamation Plant:

North City Water Reclamation Plant & South Bay Water Reclamation Plant

Treats wastewater from homes and businesses to a level that is safe enough to be reused for irrigation and industrial purposes.

Advanced Water Purification Facility:

AWP Facility at North City Water Reclamation Plant

Purifies the recycled water produced at a water reclamation plant using micro/ultrafiltration, reverse osmosis and ultraviolet disinfection/advanced oxidation. Currently this water is sent back to the recycled water system for irrigation and industrial purposes. If it is approved for a full-scale project, the purified water would be added to San Vicente Reservoir.

San Diego recycles...its water

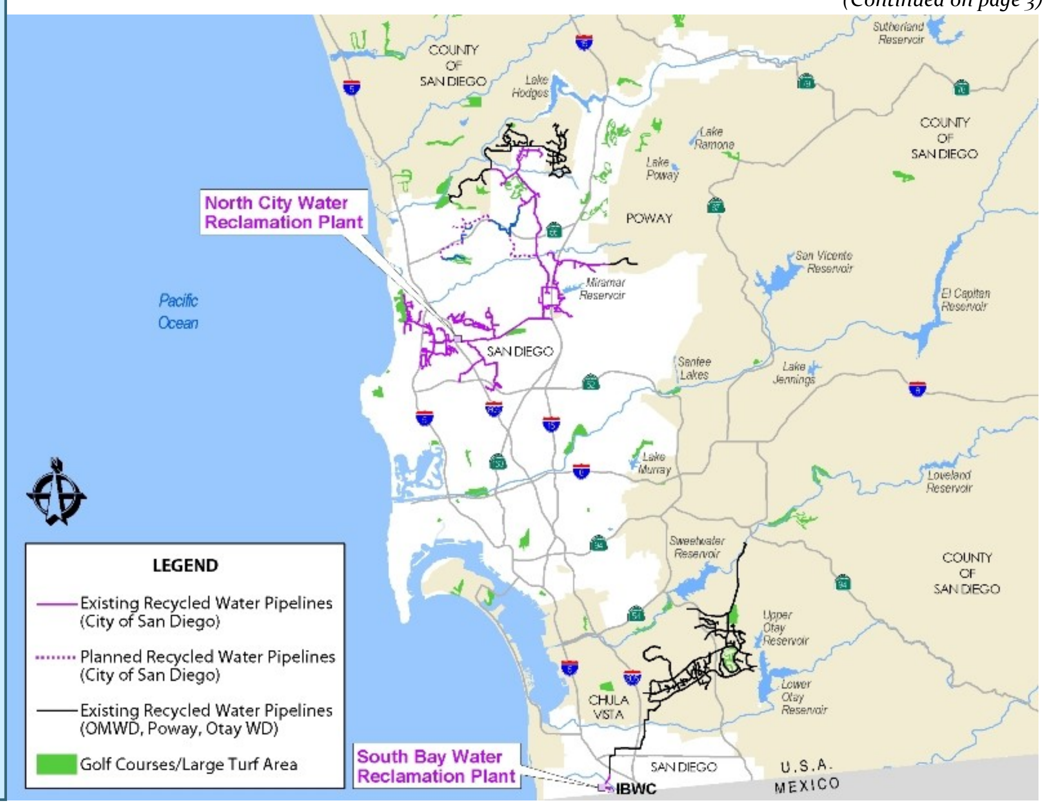
Have you ever driven by a San Diego golf course and thought about how much water must be used to keep a golf course green? This question might occur to many people as San Diegans are reminded of the importance of water conservation. While it may seem like a lot of water, there is a good chance that the water you see coming out of golf course sprinklers is recycled water. This type of water is an essential part of San Diego's diverse "water portfolio."

Recycled water is wastewater that has been treated to meet standards for use in a range of non-drinking applications. Landscape irrigation is the single largest use for recycled water within the City of San Diego. Recycled water is also used for industrial processes, cooling towers, soil compaction, dust suppression, and toilet flushing. It is reliable, drought-proof, good for the environment and has the added bonus of being a locally controlled water resource that is dependable year-round.

Two plants are responsible for producing recycled water for the northern and southern regions of the City: the North City Water Reclamation Plant built in 1997 and the South Bay Water Reclamation Plant built in 2002. Together, they have the capacity to treat up to 45 million gallons of wastewater per day. The City is not alone in recycling its wastewater—other water agencies in San Diego County also produce recycled water for irrigation and industrial purposes.

This year, recycled water has come to serve another function as the source water for San Diego's Water Purification Demonstration Project. That's right! The water that is

(Continued on page 3)



San Diego recycles… its water *[continued from page 2]*

being purified to a level similar to distilled water quality is already treated before it undergoes a three-step purification process at the Advanced Water Purification Facility.

And since the Demonstration Project is just that—a demonstration--the purified water is currently being put back into the recycled water system. So while you won't be able to drink it, those thirsty blades of grass on the 14th hole will.

For more information about the City 's Recycled Water Program visit sandiego.gov/water/recycled.

Limnology study: A look at the San Vicente Reservoir

Why send the purified water to a reservoir?

Reservoir augmentation allows the water to be diluted with the existing water supply as part of the multi-barrier treatment process. The detention time in a reservoir is one of the many safeguards built into the process to insure that a failure or error at any given treatment step would not compromise public health. The reservoir also provides further, natural treatment by exposing the water to sunlight and allowing it to blend with minerals existing in the reservoir.

Why San Vicente Reservoir?

Following the completion of the San Vicente Dam Raise in 2014, the San Vicente Reservoir will be the largest reservoir in the San Diego region at 247,000 acre-feet. Blending the purified water in a large reservoir allows it to be diluted with San Diego's imported water supply before being treated again for use as drinking water.

While the Advanced Water Purification Facility has been the center of attention since it opened in July, there is additional and equally important behind-the-scenes work being done on the Water Purification Demonstration Project. If approved to be a full-scale project, the City of San Diego would add purified water to San Vicente Reservoir, a process known as reservoir augmentation. Therefore, a scientific undertaking, called a limnology study, is now being conducted to examine the key functions of the reservoir as it pertains to its physical, geological, and biological attributes. Although no purified water is being added to the reservoir during the study, a computer model of San Vicente is being used to determine the behavior of the reservoir and what will happen if purified water is added.

> …a computer model of San Vicente is being used to determine the behavior of the reservoir and what will happen if purified water is added.

The reservoir aspect of the Demonstration Project is unique to San Diego's approach. Water purification technology has been established in areas around the world and is being used in California, specifically at the 70-million-gallon-per-day Groundwater Replenishment (GWR) System in Orange County. One way that a full-scale project in San Diego would differ from the GWR System is that Orange County injects its purified water into existing groundwater basins as part of the multi-barrier treatment process before the water becomes part of their drinking water supply. San Diego does not have large groundwater basins, so the City is working with the San Diego Regional Water Quality Board and the California Department of Public Health to consider blending the purified water with surface water and develop the necessary regulations to do so. The project and regulators want to validate that the purified water has no negative effect on the reservoir as a source of water supply to the City or on the ecological balance of the reservoir and its surrounding environment.

The limnology study uses a state-of-the-art computerized model of the San Vicente Reservoir to predict the behavior of the reservoir throughout the year. The model is calibrated and validated using existing data from testing and monitoring the actual reservoir.

San Vicente Reservoir

A reason to celebrate

Demonstration Project Direct Marsi Steirer accepts the WateReuse Association Public Outreach and Education award in September.

One of the goals of the Water Purification Demonstration Project is to inform the public about the science behind the water purification process. In September, the WateReuse Association recognized the City of San Diego's outreach efforts in achieving this goal by honoring the Demonstration Project with the **2011 WateReuse Association Public Outreach and Education award**. The City appreciates the WateReuse Association's recognition of the Demonstration Project team's efforts to keep the public informed and involved in this important project for San Diego's future.

The Demonstration Project team earned this award by providing information to thousands of San Diegans over the last year through nearly 100 speakers bureau presentations, more than 100 tours of the City's treatment facilities, informational booths at nearly two dozen community events, approximately 100 meetings with leaders of various organizations and communities throughout San Diego, and information shared through print and electronic materials.

Sharing information about San Diego's need for more local water supply sources cannot be done alone. We are grateful to those of you who have taken the time to listen to our messages, tour our facilities, invite staff to present at your organizations' meetings, read our informational materials, provide us with valuable feedback, and share this information. with friends and family. Our work is far from over, but with your help, we hope to reach all San Diegans.

To schedule a presentation for your organization, email purewatersd@sandiego.gov or call (619) 533-6638.
Visit www.purewatersd.org/tours.shtml to sign up for a tour of the AWP Facility.

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Get the latest online

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Pure News

Water Reuse Program

Water Purification Demonstration Project

Winter 2012

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

Pure News: Issue 5

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project.

Putting the AWP Facility to the Test

What's being tested

Below are a few of the many parameters being tested at the AWP Facility:

Conductivity: corresponds to the concentration of dissolved salts and metals

Nitrogen: an element that can promote algae growth in a reservoir

Total organic carbon: a measurement of the amount of natural and synthetic organic materials dissolved in water

Turbidity: a measurement of water clarity

Ultraviolet transmittance: the ability of an ultraviolet light to pass through water

To ensure water quality, monitoring is essential at any water treatment facility. At the Advanced Water Purification Facility, automated and manual testing is regularly performed in order to ensure the water purification process is properly functioning and the water produced meets all safety regulations.

One method of ensuring the integrity of the equipment is the use of automated meters. There are more than a dozen meters throughout the facility that continuously measure various water quality parameters throughout the treatment process. In the event an anomaly is detected, the monitoring system would either trigger an alarm or automatically shut down the plant. In a full-scale plant, this would prevent any water that does not meet the water quality requirements from being added to the San Vicente Reservoir.

Operators also manually test water from sampling ports to verify the equipment is functioning correctly. The water samples are tested to ensure that contaminants are removed and that the water meets drinking water standards. These compounds include all of those regulated under the federal and state drinking water acts, as well as unregulated contaminants of emerging concern, such as pharmaceuticals and personal care products. Laboratory analysis is able to detect many compounds in concentrations as low as 5 parts per trillion. One part per trillion is comparable to one drop of water in 20 Olympic-size swimming pools.

Reverse osmosis sampling station

In addition to monitoring water quality, each piece of equipment undergoes specific tests. For example, an automatic pressure decay test is performed daily on the membrane filters. This test is sensitive enough to detect even one broken fiber and helps confirm that more than 99.99 percent of all solid particles are consistently removed by the membranes. The integrity of the reverse osmosis is confirmed by continuous tracking of water quality levels before entering and after exiting the equipment. If the quality of the water produced by the reverse osmosis units were to decline, operators can test each individual pressure vessel to locate the membrane breach. At the ultraviolet disinfection/advanced oxidation stage, the amount of power being applied tells operators whether the lamps are functioning properly. Operators also measure the hydrogen peroxide dose rate to verify that the appropriate amount of hydrogen peroxide is used.

The testing and monitoring performed at the Demonstration Project's AWP Facility not only ensures the safety of the water produced at the facility, but has the added benefit of allowing the City to determine which equipment is the most effective for purifying water. Similar water quality monitoring performed at the demonstration-scale facility would be provided at a full-scale facility. If a full-scale facility were approved, the City's priority would be to ensure only the purest and safest water is added to the San Vicente Reservoir. Additionally, all of the City's drinking water is and will continue to be tested at the City's drinking water plants before being sent to customers' taps.

Water Purification Demonstration Project: 2011 YEAR-IN-REVIEW

It has been an exciting and eventful year for the Water Purification Demonstration Project. In an effort to demonstrate that water purification can be a reliable, sustainable source of local water for San Diego, the project team strives to inform San Diegans about this important project. To this end, the project team reaches out to community members throughout the City by providing informational presentations, inviting residents to tour the Advanced Water Purification (AWP) Facility, and ensuring accessibility to information on the project website and social media platforms. The Demonstration Project and the AWP Facility have received positive feedback from project stakeholders in San Diego and internationally from Mexico, Vietnam, Australia, the United Kingdom, and Eurasian countries. Take a look at some of our 2011 highlights, including the unveiling of the state-of-the-art AWP Facility:

Before

After months of planning, design and construction, the AWP Facility was completed and began operation in June 2011.

After

The AWP Facility kicked off public tours with a visit from Mayor Jerry Sanders, Public Utilities Director Roger Bailey, Project Director Marsi Steirer, Councilmember David Alvarez and many local media outlets.

The Demonstration Project team has hosted more than 100 tours for over 1,500 people since the AWP Facility opened its doors. The facility has attracted San Diego residents, government leaders, and stakeholders from around the world.

Hundreds of San Diegans learned about water purification at the Demonstration Project's informational booths at citywide community events. The City hosted exhibits at the San Diego Multicultural Festival, Earth Fair, Science Expo Day, Tet Festival, FilAmFest, and a dozen other events.

More than 100 groups throughout San Diego have invited the Demonstration Project speakers bureau to present to their members. To schedule a speaker for an organization's meeting, email purewatersd@sandiego.gov or call (619) 533-6638.

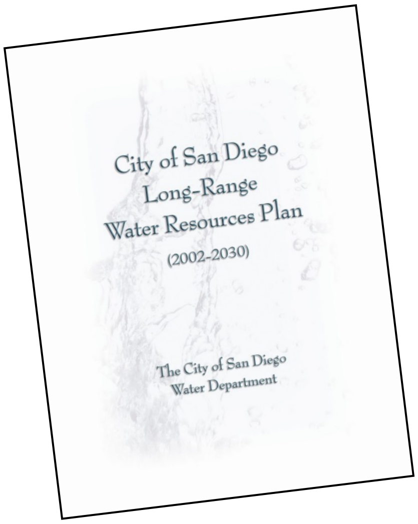
Many media outlets have covered stories on the Demonstration Project, including the Union-Tribune, USA Today, Huffington Post and TIME Magazine.

In September, the WateReuse Association honored the Demonstration Project with the 2011 WateReuse Association Public Education Program of the Year award.

Thank you to all who have taken the time to become informed and involved in this important project for San Diego's future.

Planning for a Sustainable Future

In an area where water is so scarce, strategic planning is essential to ensure water sustainability. The City of San Diego's 1997 Strategic Plan for Water Supply prompted the City to be more engaged in the planning and development of its water supply in order to become less reliant on imported water. Previously, the City depended almost entirely on the San Diego County Water Authority (SDCWA) to plan for and acquire necessary water supplies.



2002 Long-Range Water Resources Plan

In 2001, the City, with the assistance of a citizen's advisory committee, initiated an update of its Long-Range Water Resources Plan (Long-Range Plan), which was adopted by the City Council in 2002. The objectives of the Long-Range Plan were to extend water demand projections through 2030 and to develop a decision-making framework for evaluating water supply options to meet these demands. The water supply options identified in the Long-Range Plan included water conservation, water reclamation, groundwater desalination, groundwater storage, ocean desalination, marine transport, Central Valley water transfers, and imported supply. Various water supply options were evaluated. It was determined that no single supply source would be sufficient to meet the City's future water demand.

2012 Long-Range Water Resources Plan

In April 2011, the City began work on the 2012 Long-Range Water Resources Plan (2012 Plan) to update the 2002 Long-Range Plan. In developing the 2012 Plan, the City has convened a stakeholder committee, who will provide guidance and input on alternative strategies for meeting San Diego's water needs through 2035. The 2012 Plan will address various concerns, including those related to population growth, water resource diversification, climate change and other issues affecting water reliability. The 2012 Plan is anticipated to be complete in summer 2012.


Point Loma Wastewater Treatment Plant

2010 Urban Water Management Plan

While the Long-Range Plan provides a foundation for water options for San Diego, other planning is continually taking place. The City's 2010 Urban Water Management Plan (UWMP) describes long-term resource planning responsibilities to ensure adequate water supplies are available to meet existing and future demands. For the UWMP, the City coordinated with SDCWA and with local water agencies and cities that receive water from the City. The 2010 UWMP assesses current demands, lays out supply expectations over a 20-year period, and details plans for various drought scenarios.


Recycled Water Study meeting

Recycled Water Study

In addition to sustaining water supplies, the City is examining ways to limit the discharge of wastewater from the Point Loma Wastewater Treatment Plant (WWTP). In order to do this, the City is conducting a Recycled Water Study to identify opportunities and provide recommendations to increase recycling of wastewater, reduce wastewater discharged into the ocean, lessen the complexity of secondary upgrades to Point Loma WWTP, and determine implementation costs. This study is the result of a cooperative agreement the City entered with two local environmental groups in 2009. The agreement requires the City to conduct the Recycled Water Study and find ways to minimize Point Loma WWTP discharges by maximizing reuse. In return, the environmental groups supported the City's waiver application to operate the Point Loma WWTP as an advanced primary treatment plant. A final Recycled Water Study project report is expected to be complete in spring 2012.

One component of the Recycled Water Study is the completion of the 2010 Recycled Water Master Plan Update (2010 RWMP). The City must update its Recycled Water Master Plan every five years to define, encourage, and develop the use of recycled water. If all of the projects identified in the Recycled Water Study are not pursued, the 2010 RWMP evaluates other opportunities to maximize the reuse of water for non-potable purposes.

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Thanks to these and other long-range water resource plans, the City has expanded its recycled water system, developed the Water Purification Demonstration Project, dramatically increased water conservation, and continued to ensure safe and reliable water for San Diego. With the continued development and implementation of these and other plans, San Diegans can count on a reliable source of water for years to come.

California's Bay-Delta: Fragile and Tapped Out



Few places in the world are as essential to their region as the Sacramento-San Joaquin Bay-Delta is to the State of California. Located on the western edge of the Central Valley where the Sacramento and San Joaquin rivers feed into the San Francisco Bay, the Bay-Delta is a capillary-like expanse of natural and manmade channels that serve as the heart of California's ecosystem and economy. Depending on the current water situation, San Diego relies on the Bay-Delta for anywhere from 25 to 60 percent of its water supply.

The Bay-Delta is also an estuary, funneling freshwater runoff from the Sierra Nevada mountain range to the ocean, resulting in a beautiful, sensitive and complex ecology. This watery marsh creates a fertile peat soil that supports California's agricultural industry. Some of the freshwater that flows into the estuary is diverted to provide drinking water to communities statewide. Water imported from today's Bay-Delta system is fully allotted with no additional water available for future demands. Local supplies must support future water demands.

In recent years, attention has focused on the fragility of the Bay-Delta system. The levee system created in the late 19th century to reclaim farmland, control flooding, and divert water for local irrigation and consumption purposes is very delicate as a result of soil erosion and deferred maintenance. During the last century, nearly 200 Delta levee failures led to island inundations. In 1998, exterior levee breaches inundated over 22,000 acres of land and threatened State Water Project and Central Valley Project facilities.

Additionally, there are concerns that human activities are causing declines in fish populations. One species impacted is the delta smelt. This two-inch fish is considered an environmental indicator—meaning the health of the delta smelt population might be a reflection of the health of the Delta itself. In 2009 the California Fish and Game Commission reclassified the delta smelt from "threatened" to "endangered." In an effort to address the declining population of the delta smelt and other indicator fish species, court-ordered pumping restrictions have curtailed how much water gets sent through the California Aqueduct to Central and Southern California.

This means that a once reliable source of San Diego's water supplies now faces challenges limiting its accessibility. San Diego is particularly vulnerable to a shortage of imported water due to its limited local groundwater and surface water supplies. Developing local water supplies is critical to our economy and quality of life. One of these potential local water sources is purified water, which is the process being examined by the Water Purification Demonstration Project. By purifying recycled water and augmenting local reservoirs, the City can ensure a sustainable water source for San Diego, mitigate its dependence on imported Bay-Delta water, and lessen the environmental impact to a magnificent natural resource.

Did You Know?

Why do we need more water after the recent rain?

Even though winter rain helps, San Diego is located in a semi-arid desert climate and periodic droughts are inevitable in California. It is always important to use water wisely. Developing local reliable water sources, along with conservation efforts, are key components in San Diego's plan for a sustainable future.

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Pure News

Summer 2012

Water Reuse Program

Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

Water Purification | Demonstration Project

Pure News: Issue 6

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project.

Moving Right Along

It's hard to believe it has been one year since the Advanced Water Purification (AWP) Facility began operation in June 2011. This demonstration facility purifies one million gallons of recycled water a day for testing and analysis before being diverted back to the City's recycled water system. The purification process uses microfiltration and ultrafiltration, reverse osmosis, and ultraviolet disinfection with advanced oxidation. The AWP Facility will continue to operate and offer tours through next year.

Although the AWP Facility is the centerpiece of the Demonstration Project, other behind-the-scenes work has been taking place as part of the project. For more than two years, staff have been conducting a study of the San Vicente Reservoir, working with California Department of Public Health and the San Diego Regional Water Quality Control Board to define regulatory requirements, and determining the cost of a full-scale project.

A final report compiling the results of the project's components is scheduled for completion at the year's end. The report will be available to the public following its release to the Mayor and City Council.

Pulling Out All the Stops for Purified Water

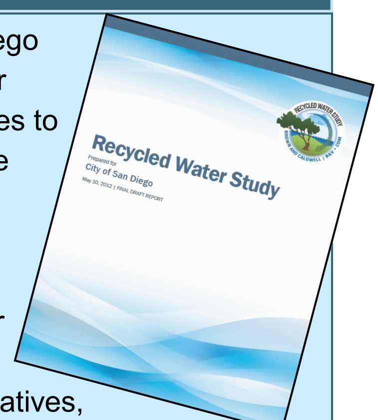
When it comes to water purification, many people refer to it as "toilet-to-tap." Although that is a catchy alliteration, it fails to indicate the comprehensive treatment process of purifying recycled water. In fact, recycled water would go through multiple treatment steps before reaching customers' faucets in a full-scale project. These steps provide multiple safety barriers so that public health is protected.

Pre-AWP Facility Barrier: Recycled Water

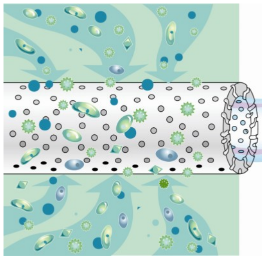
Before the purification process, wastewater from homes and businesses is treated at a water reclamation facility to a level suitable for irrigation, manufacturing and other non-drinking purposes. This treated water is called recycled water and is safe for human contact. The Water Purification Demonstration Project further treats the recycled water at the AWP Facility.

(Continued on page 2)

Expanding Recycled Water Use



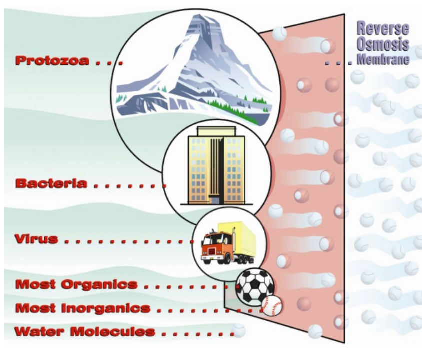
In 2009, the City of San Diego launched a Recycled Water Study to look at opportunities to maximize wastewater reuse and reduce the amount of treated wastewater discharged into the ocean via Point Loma Wastewater Treatment Plant. The Study features reuse alternatives, including water purification, to increase the use of recycled water and to decrease the City's reliance on imported water. A report on the Study's findings was presented to the San Diego City Council on July 17. They are also available online at sandiego.gov/water/waterreuse/pdf/recycledfinaldraft120510.pdf.



AWP Facility Barrier 1: Membrane Filtration

The first step upon entering the AWP Facility is membrane filtration. Recycled water is pushed by pumps through the membrane filtration's thousands of hollow fibers. These fibers have very fine pores that filter out bacteria, protozoa and particles. Microfiltration and ultrafiltration are two types of membrane filtration.

AWP Facility Barrier 2: Reverse Osmosis



The water treated by membrane filtration then enters the reverse osmosis units. In this step, water is pumped through semi-permeable membranes which let water molecules pass through, but blocks microorganisms, such as viruses.

AWP Facility Barrier 3: Ultraviolet Disinfection/Advanced Oxidation

After reverse osmosis, hydrogen peroxide is mixed into the water before undergoing ultraviolet treatment. The added hydrogen peroxide reacts with ultraviolet light to form powerfully reactive molecules that destroy any remaining organic matter in the water. This advanced oxidation process completely disinfects the water of any remaining organisms in addition to destroying any remaining contaminant chemicals.

Post-AWP Facility Barrier: San Vicente Reservoir

Now that the water has gone through membrane filtration, reverse osmosis, and ultraviolet disinfection with advanced oxidation, the resulting water is similar to distilled water quality. During the Demonstration Project, this water is returned to the recycled water distribution system for irrigation and industrial uses; it is not currently added to the drinking water supply. If a full-scale water purification project were approved, the purified water would be sent to San Vicente Reservoir via a 23-mile pipeline.

At San Vicente Reservoir, the purified water would mix with and be diluted by the existing water supply. The reservoir also provides further treatment by exposure to sunlight and other natural cleansing processes.

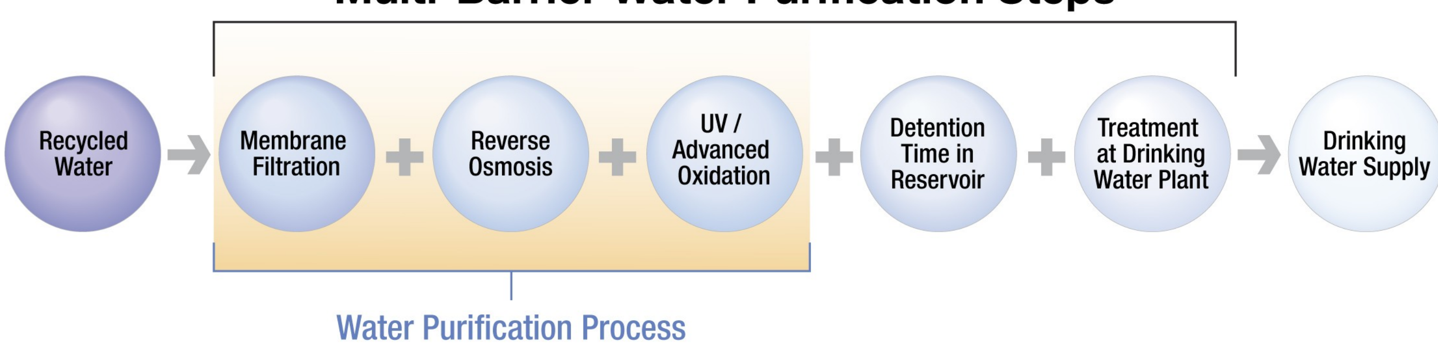
Post-AWP Facility Barrier: Drinking Water Treatment Plant

The final step for the blended water (raw water from the reservoir and the purified water) before reaching customers would be a drinking water treatment plant. There the blended water would undergo additional treatment to make it safe to drink.

Testing & Monitoring

Throughout the entire process, water would be tested and monitored to ensure contaminants are removed and the final product meets state regulations. If any anomalies were detected with the water quality at any point, the process would be halted and the water would not reach customers. Although the multiple barrier process may seem excessive, these safeguards ensure that San Diegans would receive the highest quality and safest water possible.

Multi-Barrier Water Purification Steps



Celebrating a Year of Tours

When the AWP Facility opened in June 2011, the City supplemented its existing outreach program with something more tangible: a tour experience. From the very first tours of the facility, tour guides have engaged visitors and explained the need for a local and reliable water supply, led them through an up-close experience with the water purification equipment, and challenged them with a quiz comparing purified water to tap and recycled water. Almost 200 tours later, the tour program continues to provide guests a unique insight into water purification.

Nearly 2,500 guests have toured the AWP Facility since its opening. Visitors range from members of the public to elected officials; from elementary school classes to fourth-year medical students; from Girl Scout troops to professional societies; from people who live down the street from the facility to people all the way from Australia, the UK, India, and other countries.

The Demonstration Project has welcomed many San Diegans to the AWP Facility, and it's not stopping yet. Tours are expected to continue through summer 2013. So gather your friends, family, neighbors, coworkers and organizations to come for a look at what may be one of San Diego's future water sources. To register for a tour, visit purewatersd.org/tours.shtml. If you can't make it out for a tour, staff would be happy to make a presentation to your organization. Contact purewatersd@sandiego.gov to schedule a presentation or to register a large group for a tour. Hope to see you soon!

Out of the Mouths of Babes:

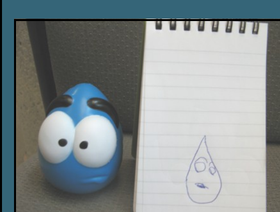
Dear Tour Leader,

I Love the raindrop. I liked The Tours I Love the part when they changed from bad water to clean water. Thank you for the Tour.

Dear tour leader,

I enjoyed the movie and the droplets. Thank you for taking some of your time to give my class a tour of the plant.

Thankyou for teaching me how to use less water. I enjoyed when you showed me what stages it goes through until it goes to my house.



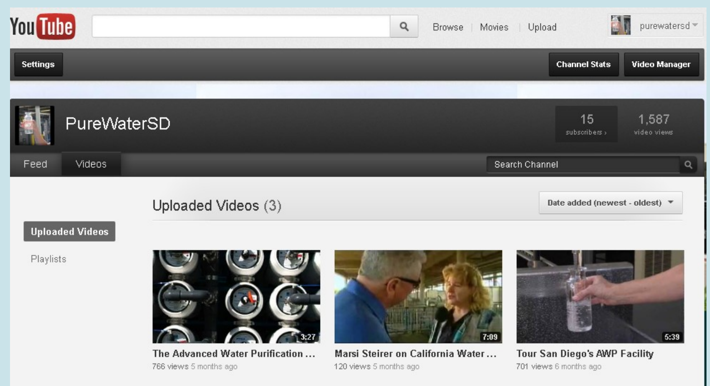
Get Social

The Demonstration Project is social-media savvy! We are on Facebook, Twitter and YouTube and want your participation. By "liking," following, and subscribing to the Demonstration Project on Facebook, Twitter, and YouTube, you can interact with the Demonstration Project team and find out what's going on with the future of San Diego water.

Find us on Facebook at facebook.com/SanDiegoWPDP. There you can read the latest information about the project, view photos of the AWP Facility and tour participants, ask questions of the Demonstration Project team and find links to interesting articles about water issues in California and around the globe. Our Facebook page is a great first step to learning about the Demonstration Project.

Follow us on Twitter @PureWaterSD to not only keep current on the Demonstration Project, but to also participate in the dialogue of the sustainable water community. Tweet at us for a direct reply, and retweet to your followers what you find interesting.

Subscribe to our YouTube page at youtube.com/PureWaterSD and view a virtual tour of the AWP Facility. You can also watch how the multi-barrier filtration process works to produce clean, clear water from recycled water. There is also a clip from California's Gold with Huell Howser featuring project director Marsi Steirer explaining the water purification process. Comment on the videos and let us know what you think.



Your participation on our social media platforms ensures your active contribution toward the future of San Diego's water supply. We look forward to hearing from you!

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Water Reuse Program

Water Purification Demonstration Project

Fall 2012

The City of San Diego • Public Utilities Department

Water Purification Demonstration Project

Pure News: Issue 7

Welcome to Pure News, a newsletter to keep you informed about the latest happenings with the City of San Diego's Water Purification Demonstration Project.

San Diego Is Leading the Way

San Diego is paving the way for water purification not just locally, but also nationally and internationally. As water supplies shrink worldwide and with growing interest in sustainable water programs, water purification is gaining momentum as a potential solution to depleted water resources. There are great examples of full-scale water purification facilities operating successfully, such as Singapore's NEWater and Orange County's Groundwater Replenishment System. For cities and water agencies around the world, however, San Diego's Water Purification Demonstration Project exemplifies a key step in the development of a full-scale water purification project.

Orange County's water purification facility

Visitors from all over the world have come to San Diego to learn more about the Demonstration Project , which includes the installation and operation of a one-million-gallon-a-day Advanced Water Purification (AWP) Facility, a study of the San Vicente Reservoir, a pipeline alignment assessment and an extensive public outreach and education program. Since opening in June 2011, the AWP Facility has welcomed guests from nearly 20 countries, including Mexico, Australia, Vietnam, Spain, India, China, the United Kingdom, Iraq, Brazil and Ukraine. There are also many American visitors, including guests from Arizona; Florida; Massachusetts; Texas; Utah; Washington, D.C. and cities throughout California. These guests come to get ideas on how to implement water purification in their own locales.

The project has also received industry awards recognizing its achievements. The WateReuse Association, an international group of organizations and individuals working together to improve and increase local water supplies, honored the Demonstration Project with the 2012 WateReuse Small Project of the Year Award. The award provides industry recognition for successful small (less than five-million-gallons-a-day capacity) projects that have made significant contributions to advancing water reuse. Last year, the WateReuse Association recognized the Demonstration Project's outreach program as the 2011 WateReuse Public Education Program of the Year.

While it is important to have national and international recognition, the purpose of this project is to determine whether water purification is a feasible option for expanding San Diego's local water resources. The public outreach program's goal is to provide information about the project to as many San Diegans as possible. The outreach team will continue to encourage residents to learn about the project through presentations and facility tours throughout 2013. Request a presentation by emailing PureWaterSD@sandiego.gov or by calling 619-533-6638. Sign up for a tour online at www.purewatersd.org/tours.shtml.

San Vicente Reservoir Limnology Study:
An overview of the study and what it has shown

If the Demonstration Project advances to a full-scale project, purified water would be added to the untreated or "raw" water that is already stored in the San Vicente Reservoir. Part of the research conducted during the Demonstration Project was a limnology study, or a scientific study of the biological and physical features of the reservoir. Primarily, the project team needed to gain a good understanding of what effect– if any – purified water would have on the other water in the reservoir.

Although water purification technology is widely recognized as capable of purifying recycled water into drinkable water, regulatory agencies require that purified water be retained in an "environmental buffer," such as a groundwater basin or a surface water reservoir, before it becomes part of the drinking water supply. Adding purified water to an environmental buffer provides a public health barrier: dilution with other water sources and retention time that allows for additional natural treatment.

San Vicente Reservoir would serve as an effective environmental buffer for a full-scale project in San Diego. The reservoir stores a large volume of water capable of providing adequate dilution and retention of the purified water and, most importantly, exhibits seasonal stratification (see Page 3). A three-dimensional hydrodynamic model of the reservoir was developed by experts from the firm Flow Science, and was reviewed and accepted by the Demonstration Project's Independent Advisory Panel (IAP).

San Vicente Reservoir has been studied many times in the past. In fact, tracer studies of the reservoir were conducted in the 1990s. A tracer study involves putting an element in the water at a specific point and tracing its path through the reservoir. This provides an understanding of how water mixes in the reservoir. These tracer studies provided good background for the current study, which involved running the three-dimensional hydrodynamic model 18 times. The project team - with input from the IAP and regulators - selected eight modeling scenarios that represent the full range of operational conditions the full-scale reservoir augmentation project could encounter. The key findings are:

- The addition of purified water to San Vicente Reservoir would not affect the natural hydrologic characteristics of the reservoir (the natural dilution and retention in the reservoir).
- Dilution and retention of purified water in San Vicente Reservoir would constitute a substantial environmental barrier, sufficient to meet regulatory requirements.
- For all anticipated reservoir operating scenarios and purified water entry locations, the reservoir would dilute the purified water by a factor of at least 200 to one at all times.
- The addition of purified water would not negatively affect any aspect of water quality in San Vicente Reservoir. Independent of the Demonstration Project, the San Vicente Dam has been raised to a height of 337 feet. The expanded reservoir will hold over 240,000 acre-feet of water (more than double its original 90,000 acre-feet), which will improve the overall water quality in the reservoir. The addition of purified water will have no effect on these improvements.

What is a three-dimensional hydrodynamic model?

"Hydrodynamics" is the movement of water. The three-dimensional hydrodynamic model of San Vicente Reservoir is a computer-based model that simulates and predicts the movement of water in all three directions within the reservoir: up and down, left to right, and fore and back. The model incorporates solar heating, wind speed and direction, water inflows and outflows, evaporation and rainfall, and air temperature. Equations in the model calculate heating and cooling, mixing, and dilution of the reservoir water.

BREAKING NEWS: The California Department of Public Health, a key regulator in this project, provided written approval of the City's proposed reservoir augmentation concept in September 2012, stating that the City's concept "will not compromise the quality of the water derived from San Vicente Reservoir."

What is reservoir stratification?

Reservoir stratification – the formation of layers of water within a reservoir – is a natural phenomenon that occurs in nearly all reservoirs in western North America, including San Vicente Reservoir. Consistent and predictable stratification has been observed over more than twenty years of monitoring at San Vicente Reservoir. During the period of stratification, which lasts for about eleven months each year, surface water is heated by the sun. Because this warm water is less dense than cooler water it "floats" in the top-most layer of the reservoir. The denser, cooler water remains in the lower layer of the reservoir. During stratification, any dissolved or suspended constituents in the surface water do not readily mix with the water and constituents in the deep water. In winter the surface water cools, causing water temperature in the reservoir to equalize so that the surface and deep water mix, or destratify. The fully destratified condition lasts for a few weeks to a month and typically occurs during January or February. The natural stratification and mixing of San Vicente Reservoir is an important phenomenon because it determines the extent and timing of dilution and retention provided by the reservoir.

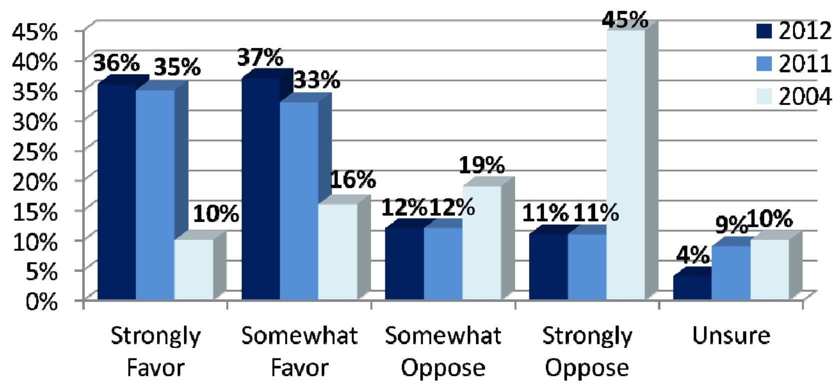
Understanding Local Water Attitudes

To get a better idea of public opinions regarding water issues throughout the county, the San Diego County Water Authority regularly conducts public opinion polls. For 2004, 2011, and 2012, the City of San Diego requested a sample of City residents be polled to ensure we have a good base knowledge about water attitudes in the City, including opinions regarding the use of water purification to create new water supplies.

The results from the latest research study are now available and show a steady increase in acceptance of water purification. Some of the questions and findings are below:

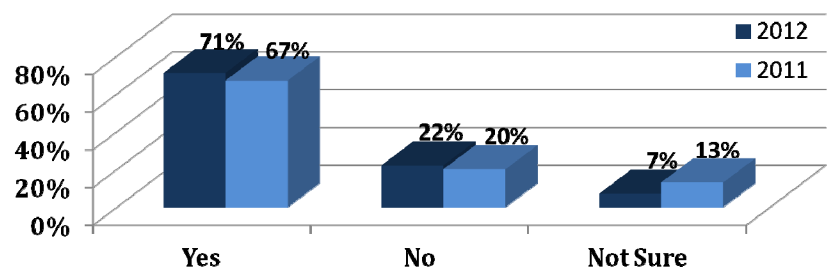
How would you feel about using advanced treated recycled water as an addition to the supply of drinking water?

- In 2004, only 26 percent favored using advanced treated recycled water (or purified water) to help diversify the City's water supply
- In 2012, favorability jumped to nearly three-fourths of City residents



Do you believe that it is possible to further treat recycled water currently used for irrigation to make the water pure and safe for drinking?

- The 2011 survey found 67 percent of the nearly 400 respondents felt that it is possible to further treat recycled water for drinking purposes
- A year later, 71 percent believe it is possible



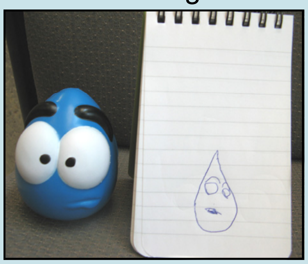
Despite these positive findings, many respondents were still unaware that San Diego is testing water purification locally. Additionally, the majority of respondents also did not know that Orange County's drinking water supply is supplemented with purified water produced using the same purification process being tested by the Demonstration Project. The Demonstration Project team continues to educate San Diegans about this test phase to increase local knowledge about water supply challenges and the science of water purification.

The entire public opinion poll findings can be found online at www.sandiego.gov/water/waterreuse/pdf/sdcwasurvey2012.pdf.

Year in Review: Building on the Momentum of 2012

This has been a productive and exciting year for the Demonstration Project. Our staff is grateful to the people of San Diego who helped spread the word about the project. We are proud to have spent almost every day in 2012 engaging curious and enthusiastic groups, decision makers and community members in the Water Purification Demonstration Project through tours, presentations, events and social media.

Since the tour program began in mid-2011, we have led over 225 AWP Facility tours for more than 3,000 participants. While we were honored to have visitors from as far away as Australia and Iraq tour the facility, some of our favorite guests have been children who asked thoughtful questions and got us to look at water purification in a whole new light. From drawings about the very curious "Wobbly the Waterdrop" to asking important questions about the water they are already drinking, educating young people is an important element of the project's outreach efforts. We have hosted 2nd graders who are just learning the terms associated with water purification, medical students who are interested in the technology, Girl Scout and Boy Scout troops, rotary clubs, senior groups and members of the military.



In addition to the tours, our speakers bureau has presented information about water purification to more than 120 groups and organizations in San Diego County. We have also participated in over 40 community events in each of San Diego's City Council Districts, as well as shared project updates and connected one-on-one with interested parties through active pages on Facebook and Twitter.

Decisions made about water supply sources today will determine how reliable San Diego's water supplies are in the future. Therefore, it is important to the Demonstration Project team that we share information with as many San Diego residents as possible about our future water needs and the role of this project.

Thanks again for making 2012 a great year for the Demonstration Project. We look forward to building on our momentum and continuing to share information about water purification at more events, presentations and tours in the coming months. Additionally, a final report wrapping up all of the project's findings is due out in 2013. Until then, we wish you and yours a happy holiday season. See you in 2013!

@PureWaterSD

Get the latest online

For our smartphone-savvy readers, use your barcode-scanning app of choice to scan the quick response (QR) barcodes to the left and right. You'll be an official Demonstration Project fan in no time!

Not receiving email updates from the Demonstration Project? Sign up at www.purewatersd.org or email purewatersd@sandiego.gov.

SanDiegoWPDP

To schedule a presentation for your organization, email purewatersd@sandiego.gov or call (619) 533-6638.

Visit www.purewatersd.org/tours.shtml to sign up for an AWP Facility tour.

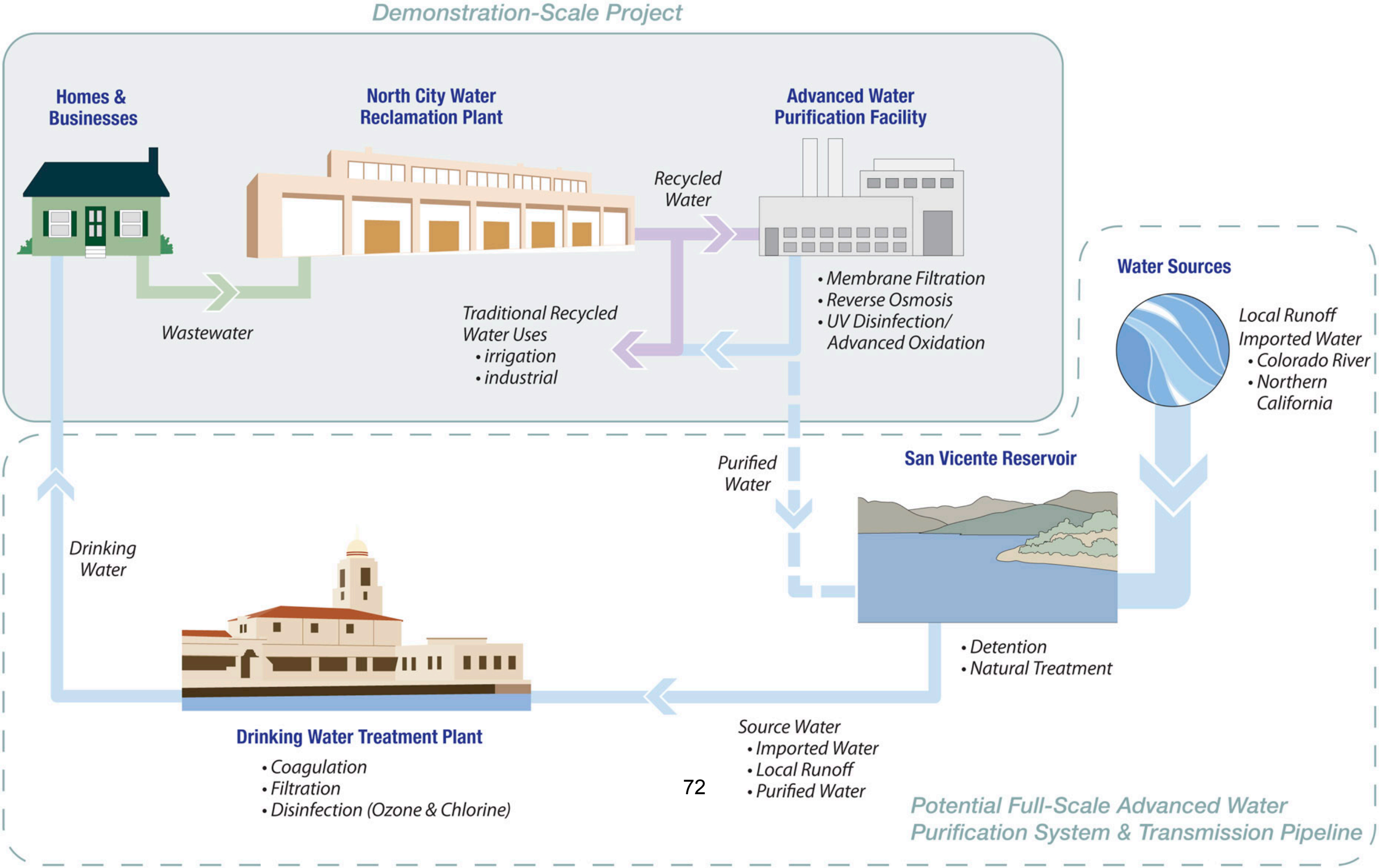
THE CITY OF SAN DIEGO

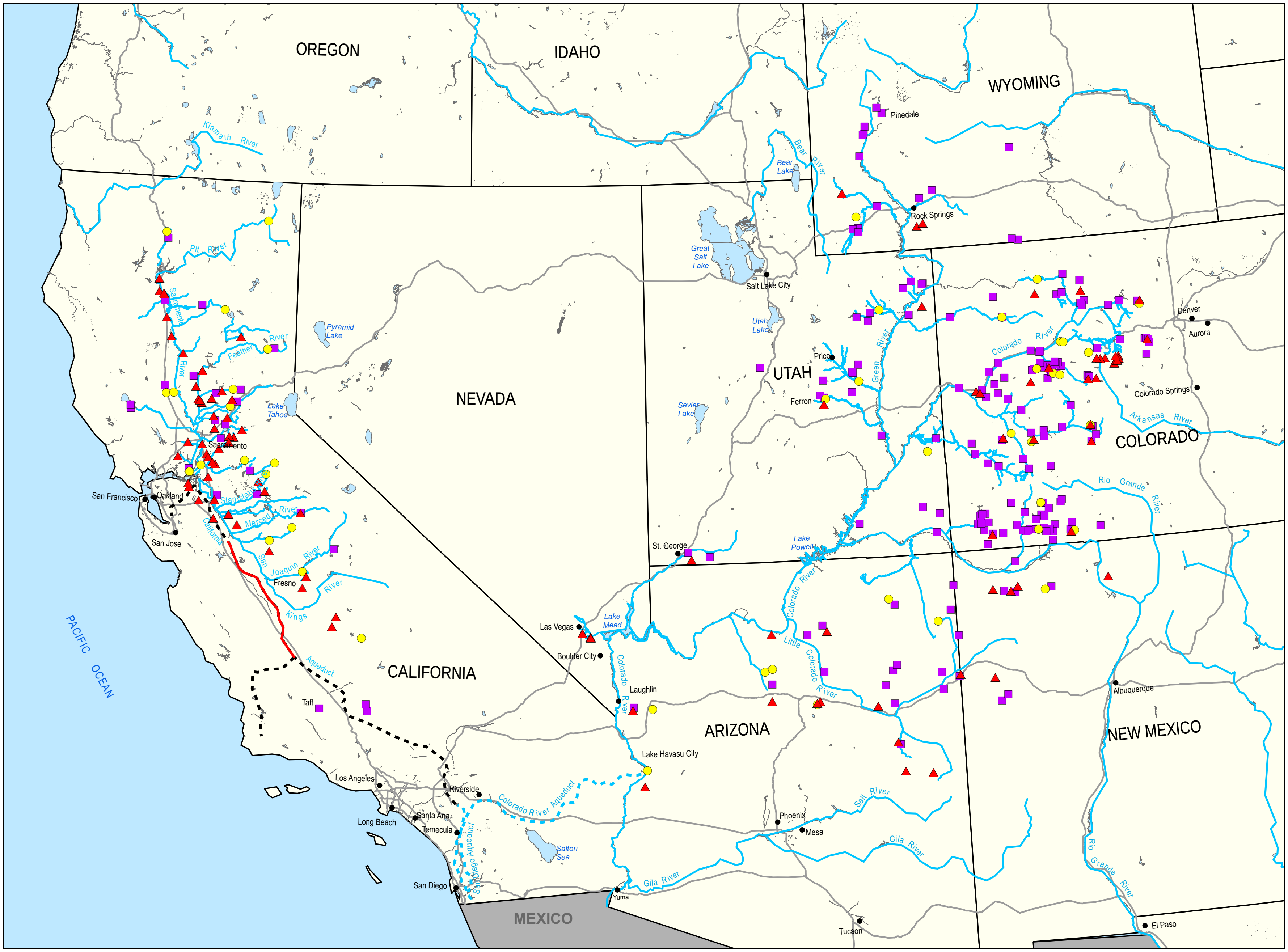
PureWaterSD.org

City of San Diego PUBLIC UTILITIES Water & Wastewater

Poster Boards

City of San Diego's
Water Purification Demonstration Project
Purification Process





Municipal Wastewater NPDES Facilities

Colorado River & State Water Projects

City of San Diego PUBLIC UTILITIES Water & Wastewater

SanGIS

N

0 20 40 80 120 160 Miles

LEGEND

- ▲ 1.0> MGD
- ● .5 - <1.0 MGD
- ■ <.5 MGD
- FREEWAYS
- RIVERS
- COLORADO/SAN DIEGO AQUEDUCT
- SWP AQUEDUCT
- STATE-FEDERAL WATER PROJECT

MGD = Flow in million gallons per day *
Facility locations are approximate

* Source for flow rate: Colorado Salinity Forum Oct 31, 2008
& California Department of Water Resources
& U.S Environmental Protection Agency

Note:
At any given time many of the permits identified in this map are being reviewed, reissued, and/or terminated, and new discharge permits are being filed, this data must be considered as being subject to frequent changes

Geographic Data based on maps obtained from The National Atlas of the United States of America & Environmental Systems Research Institute, Inc. (ESRI) data.

N:\Resources & Planning\Water Purification Demonstration Project\Public Outreach\Outreach Materials\Graphics\Discharge Map NPDES Facilities_2011.pdf coordinates_1/24/11.mxd

In the World of Water, We are All Downstream

1962
LACSD Montebello Forebay Groundwater Recharge Project

1976 - 2008
OCWD Water Factory 21 Seawater Barrier

2005
IEUA Chino Basin Recycled Water Groundwater Recharge Project

2005
Los Angeles County Dept. of Public Works (LACDPW) Alamitos Seawater Barrier

2005
UOSA WRF capacity is expanded to 54 MGD

2008
OCWD GWR System Seawater Barrier & Groundwater Recharge Project starts and Water Factory 21 is discontinued

Timeline for Potable Reuse Projects in U.S.

1960 1970 1980 1990 2000 2010

1978
Upper Occoquan Service Authority WRF (UOSA WRF) in Fairfax, Virginia starts operation to improve water quality in the Occoquan Reservoir, a major potable water source

1985
Hueco Bolson Recharge Project in El Paso, TX

1995
LACDPW West Coast Basin Seawater Barrier

2006
LACDPW Dominguez Gap Seawater Barrier

2011
Prairie Waters Project in Aurora, CO anticipated to start operation of indirect potable reuse

2011
San Diego Water Purification Demonstration Project in San Diego, CA anticipated to start operation of indirect potable reuse demonstration project

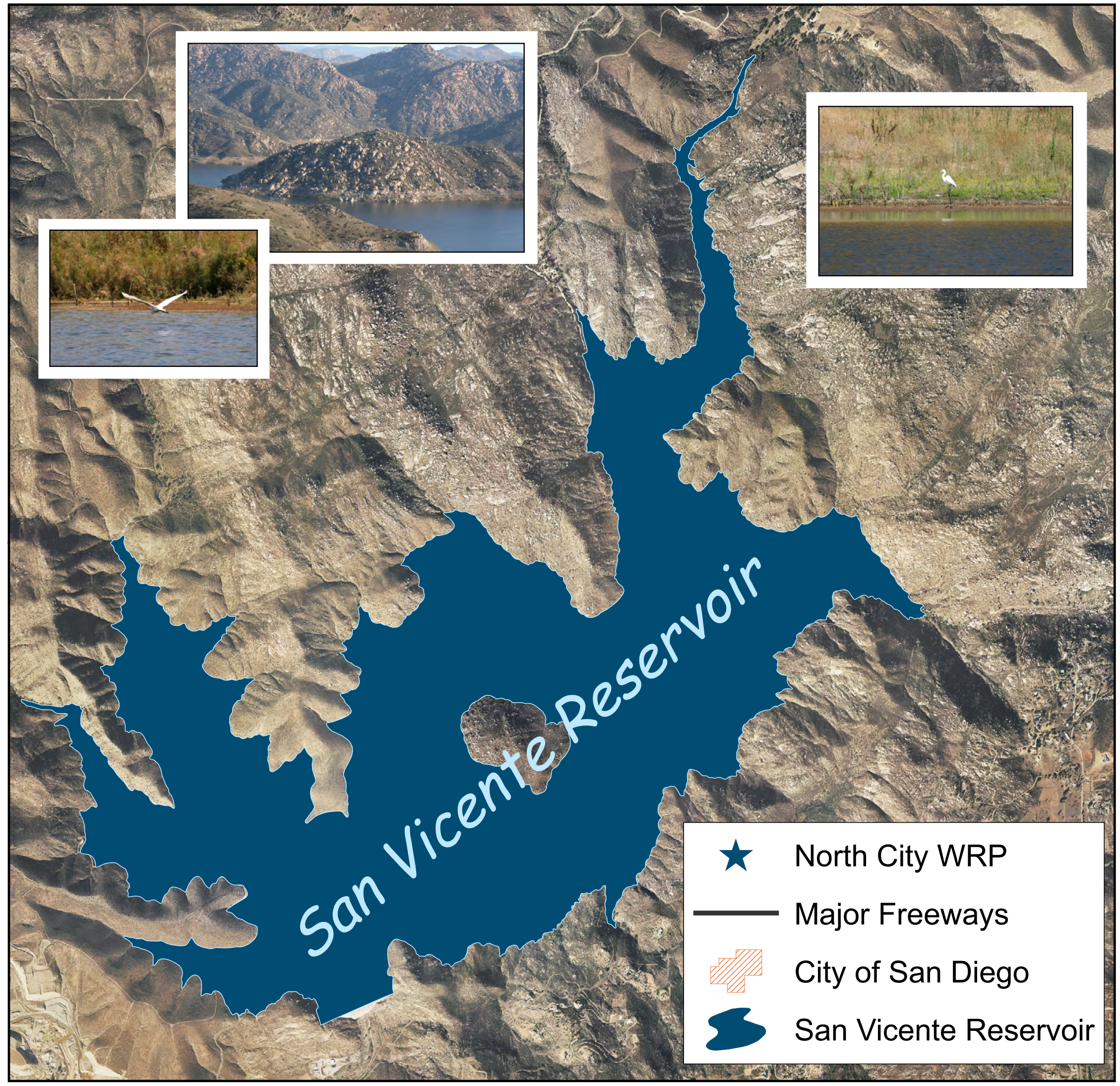
2011
El Monte Groundwater Recharge Project in San Diego County, CA anticipated to start operation of indirect potable reuse

Potable Reuse Project Details

Project	Level of Treatment	Start Year	WRF Rated Capacity (MGD)	Actual Delivery
LACSD Montebello Forebay Groundwater Recharge Project[1] Los Angeles County, CA	Tertiary with Soil Aquifer Treatment	1962	47.5	50,000
OCWD Water Factory 21 Seawater Barrier Orange County, CA	Tertiary with Microfiltration and Reverse Osmosis	1976	15	17,000
UOSA Occoquan Reservoir Indirect Potable Reuse[2] Fairfax, VA	Tertiary with High-lime Process, Chlorination & Dechlorination	1978	54	47,000
Hueco Bolson Recharge Project El Paso, TX	Tertiary with Activated Carbon, Lime Process, Ozone Disinfection	1985	10	2,000
LACDPW West Coast Basin Seawater Barrier[3] Los Angeles County, CA	Tertiary with Microfiltration, Reverse Osmosis & UV	1995	30	5,000
LACDPW Alamitos Seawater Barrier[4] Los Angeles County, CA	Tertiary with Microfiltration, Reverse Osmosis & UV	2005	3	3,000
IEUA Chino Basin Groundwater Recharge Project[5] San Bernardino County, CA	Tertiary with Soil Aquifer Treatment	2005	84.4	10,000
LACDPW Dominguez Gap Seawater Barrier[6] Los Angeles County, CA	Tertiary with Microfiltration and Reverse Osmosis	2006	4.5	1,000
OCWD GWRS Seawater Barrier & Groundwater Recharge Project Orange County, CA	Tertiary with Microfiltration, Reverse Osmosis & AOP	2008	70	75,000
Aurora Prairie Waters Project Aurora, CO	Riverbank Filtration, Advanced UV Oxidation, GAC Adsorption	2011	50	10,000
Helix WD El Monte Groundwater Recharge Project[7] San Diego County, CA	Tertiary with Microfiltration, Reverse Osmosis, Advanced UV Oxidation	2011	x	5,000
San Diego Water Purification Demonstration Project[8] San Diego, CA	Tertiary with Microfiltration, Reverse Osmosis, Advanced UV Oxidation	2011	1	N/A

Notes:
1 Recycled water is provided by Sanitation Districts of Los Angeles County's Whittier Narrows and San Jose Creek (100 MGD) WRFs.
2 Recycled water is provided by the regional Upper Occoquan Service Authority's WRF.
3 Recycled water is provided by Water Replenishment District that is purchased from West Basin MWD Edward C. Little WRF. It is blended with MWD imported water.
4 Recycled water is provided by the Water Replenishment District of Southern California's Long Beach WRF (Tert.) and Leo J. Vander Lans WTF (Adv).
5 Recycled water is provided by four Inland Empire Utility Agency water reclamation facilities; Regional Plants Nos. 1, 4 and 5 and the Carbon Canyon WRF.
6 Recycled water is provided by the Los Angeles County Flood Control District's Terminal Island Treatment Facility.
7 Recycled water to be provided by the Padre Dam Municipal Water District or the City of San Diego.
8 Recycled water to be provided by the City of San Diego North City WRF. As this is a demonstration facility only, no water will be delivered for indirect potable consumption.

North City Water Reclamation Plant to San Vicente Reservoir



North City Water Reclamation Plant to San Vicente Reservoir

Prepared by City of San Diego Public Utilities Department
Watershed and Resource Protection Team, June 29, 2011

Bookmarks

Three types of bookmarks were produced for the Demonstration Project.


CITY OF SAN DIEGO
Water Purification | Demonstration Project
www.purewatersd.org

Did you know...

The City of San Diego

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

- San Diego needs local, reliable and sustainable sources of water to lessen our dependence on imported water.
- The Water Purification Demonstration Project is examining the use of advanced water purification technology to determine the feasibility of full-scale reservoir augmentation.
- The water produced by the purification process goes through multiple steps of advanced treatment to meet all water quality, safety and regulatory requirements.
- No purified water will be added to the San Vicente Reservoir or San Diego's drinking water system during the Demonstration Project.

CITY OF SAN DIEGO
Water Purification | Demonstration Project

www.PureWaterSD.org

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CITY OF SAN DIEGO

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The City of San Diego

City of San Diego PUBLIC UTILITIES Water & Wastewater

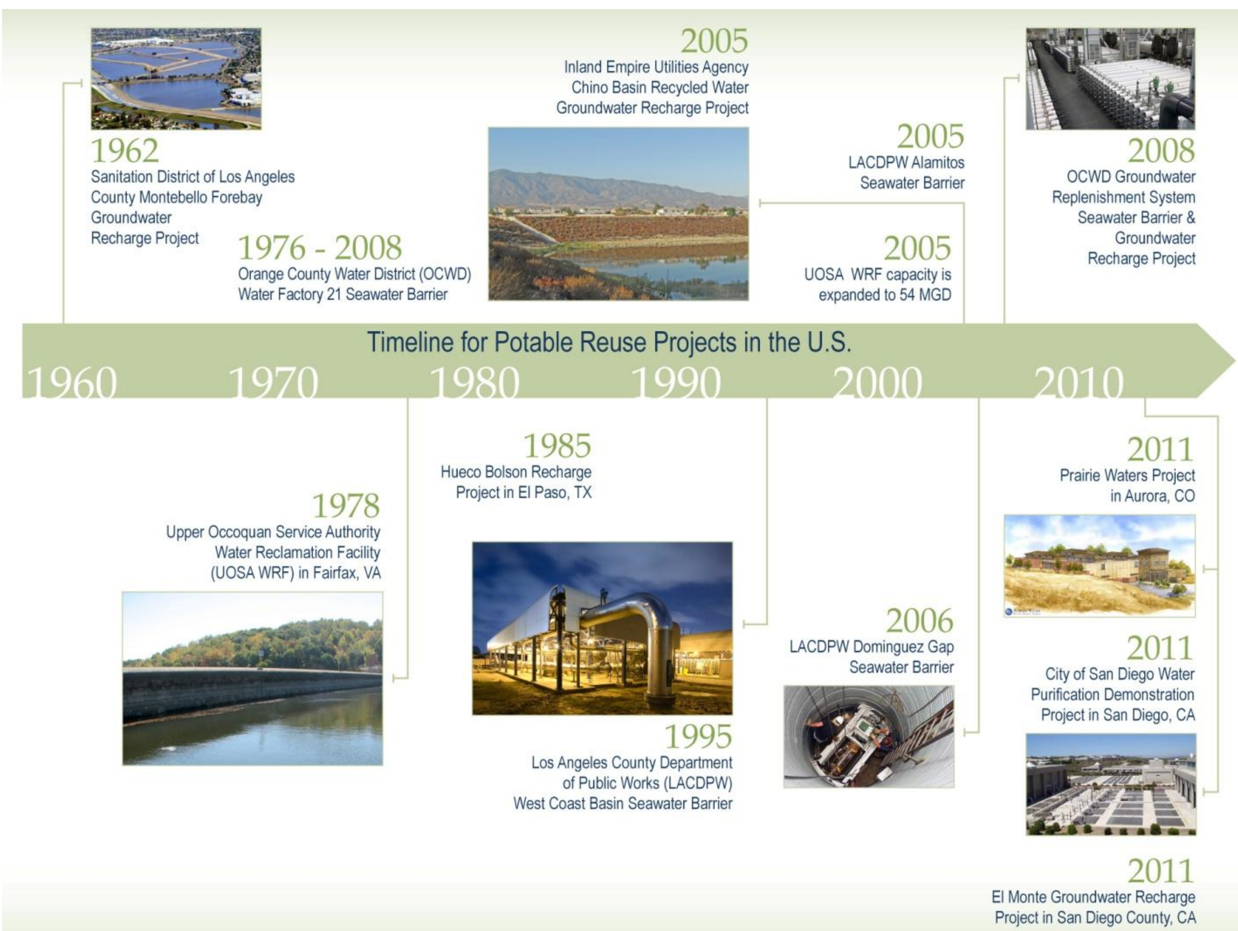
White Papers

POTABLE REUSE PROJECTS IN THE UNITED STATES

The water cycle—the continuous movement of water from ocean to air and land and back to the ocean—is as old as the earth itself. The basic underlying principle is simple: All water is recycled. There is no new water.

Throughout the developed world, wastewater has been collected and treated for return to the environment where it receives further treatment thanks to sunlight, time, and nature, prior to being used again. Today, nature cannot keep up with all the water needs of people, industry and agriculture, especially in arid regions like Southern California. As a result, human beings have accelerated this process with advanced water purification systems which, combined with natural treatment occurring in groundwater or surface water bodies, make up *potable reuse*. Advanced water purification includes additional treatment beyond tertiary for further removing constituents of concern to public health. This may include membrane filtration, reverse osmosis and advanced oxidation (WateReuse, n.d.).

This white paper presents key potable reuse projects that have been implemented in the United States beginning in the 1960s. It should be noted that almost all of these projects occur in areas with limited or no surface water reservoir storage capacity and, as such, the treated water is used to recharge groundwater aquifers. Projects that discharge into rivers or reservoirs (surface water augmentation) include the Upper Occoquan Service Authority project in Fairfax, Virginia and the Prairie Waters Project in Aurora, Colorado. A summary timeline and key fact tabulation is presented below.



Potable Reuse Project Details

Project	Level of Treatment	Start Year	WRF Rated Capacity (MGD)	Actual Delivery (AFY)
LACSD Montebello Forebay Groundwater Recharge Project[1], Los Angeles County, CA	Tertiary with Soil Aquifer Treatment	1962	47.5	50,000
OCWD Water Factory 21 Seawater Barrier, Orange County, CA	Tertiary with Microfiltration and Reverse Osmosis	1976	15	17,000
UOSA Occoquan Reservoir Indirect Potable Reuse[2], Fairfax, VA	Tertiary with High-lime Process, Chlorination & Dechlorination	1978	54	47,000
Hueco Bolson Recharge Project, El Paso, TX	Tertiary with Activated Carbon, Lime Process, Ozone Disinfection	1985	10	2,000
LACDPW West Coast Basin Seawater Barrier[3], Los Angeles County, CA	Tertiary with Microfiltration, Reverse Osmosis & UV	1995	30	5,000
LACDPW Alamitos Seawater Barrier[4], Los Angeles County, CA	Tertiary with Microfiltration, Reverse Osmosis & UV	2005	3	3,000
IEUA Chino Basin Groundwater Recharge Project[5], San Bernardino County, CA	Tertiary with Soil Aquifer Treatment	2005	84.4	10,000
LACDPW Dominguez Gap Seawater Barrier[6], Los Angeles County, CA	Tertiary with Microfiltration and Reverse Osmosis	2006	4.5	1,000
OCWD GWRS Seawater Barrier & Groundwater Recharge Project, Orange County, CA	Tertiary with Microfiltration, Reverse Osmosis & AOP	2008	70	75,000
Aurora Prairie Waters Project, Aurora, CO	Riverbank Filtration, Advanced UV Oxidation, GAC Adsorption	2011	50	10,000

Notes:
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[2] Recycled water is provided by the regional Upper Occoquan Service Authority's WRF.
[3] Recycled water is provided by Water Replenishment District that is purchased from West Basin MWD Edward C. Little WRF. It is blended with MWD imported water.
[4] Recycled water is provided by the Water Replenishment District of Southern California's Long Beach WRF (Tert.) and Leo J. Vander Lans WTF (Adv).
[5] Recycled water is provided by four Inland Empire Utility Agency water reclamation facilities; Regional Plants Nos. 1, 4 and 5 and the Carbon Canyon WRF.
[6] Recycled water is provided by the Los Angeles County Flood Control District's Terminal Island Treatment Facility.

Following are brief descriptions of key groundwater replenishment and surface water augmentation projects using advanced purified water that are currently in operation.

Los Angeles, California: Montebello Forebay Groundwater Recharge Project
The Sanitation Districts of Los Angeles County (LACSD) manage the Montebello Forebay Groundwater Recharge Project, one of the oldest ongoing natural groundwater recharge projects in the nation. LACSD has managed the project, located in southeastern Los Angeles County, since 1962.

The Montebello Project provides advanced secondary treatment (partial denitrification) and tertiary filtration/disinfection for an average of 45 MGD of water prior to spreading in basins in the Montebello Forebay area of the Los Angeles Central groundwater basin. This advanced purified water makes up about 35 percent of the total recharge to the groundwater basin, while imported water purchased from the Metropolitan Water District of Southern California and storm water runoff make up the remainder of the water used to replenish the basin, which provides water for 3.7 million people.

The Montebello Project is important because its long duration—40 years—has allowed numerous health studies that confirm the safety of groundwater replenishment projects. A heavily peer-reviewed health effects study conducted in 1976 found no measurable health issues among the people consuming the water. In 1996 and 1999, the Rand Corporation conducted epidemiological studies on the Montebello project examining the health outcomes of about 900,000 people. The conclusion reached by the Rand researchers was that after 30 years of consumption of advanced purified recharge water there was no association between project water and any ill health effects.

Fairfax, Virginia: Upper Occoquan Service Authority, Millard H. Robbins, Jr. Water Reclamation Facility
After an intensive study conducted in 1970 of water quality problems in the Occoquan Reservoir, a major source of drinking water for Northern Virginia, the Occoquan Policy (Policy) mandated the creation of an advanced water purification facility to replace the 11 secondary treatment plants discharging to the reservoir. The Policy also mandated the creation of an independent ongoing program of water quality surveillance. The Upper Occoquan Service Authority (UOSA) was created to meet the water recycling mandate of the Policy. The Occoquan Watershed Monitoring Laboratory met the requirement for independent surveillance.

The UOSA regional advanced water purification facility includes lime clarification, carbon adsorption, filtration, and chlorine disinfection. Originally a 27 MGD facility, UOSA WRF was expanded to 54 MGD in the 1990s and discharges to a final effluent reservoir prior to release to Bull Run, a tributary of the Occoquan Reservoir, about 20 river miles upstream of the water treatment plant intake. During times of normal precipitation, the advanced purified water from the UOSA WRF makes up about five percent of the total inflows to the reservoir, with percentages much higher (up to 90%) during times of drought.

Orange County, California: Water Factory 21 and Groundwater Replenishment System

Water Factory 21

From its inception in 1976, Water Factory 21 was the most recognized and highly-regarded water purification program in the water industry worldwide. It was the first project in California to use advanced water purification technologies, including reverse osmosis, to enhance secondary effluent to drinking water standards. Advanced purified water was injected into the Orange County groundwater basin in a series of wells used as a barrier against the intrusion of seawater into the basin. For over 30 years, Water Factory 21 protected the integrity of the large groundwater basin that serves northern and central Orange County while also helping to increase the reliability of the region's water supply. Water Factory 21 had a design capacity of 15 million gallons per day (MGD).

Groundwater Replenishment System

The Groundwater Replenishment System (GWRS) has been operational in Orange County since January of 2008. The GWRS replaced Water Factory 21 and expanded using a combination of membrane filtration, reverse osmosis, and advanced oxidation to address a new generation of emerging contaminants, including pharmaceuticals. The 70 MGD project, expandable to 100 MGD, purifies water to state and federal drinking water standards prior to serving the seawater injection barrier and a spreading basin recharging the Orange County groundwater basin. The underground basin provides more than half the water used by northern and central Orange County.

El Paso, Texas: Hueco Bolson Recharge Project

In order to decrease the rate at which the fresh water reserves of the Hueco Bolson were being depleted, El Paso Water Utilities looked to artificially recharge the aquifer using advanced purified water. The Hueco Bolson aquifer provides about 40 percent of the municipal water supply needs of El Paso, Texas and the surrounding area. It also supplies 100 percent of the municipal supply for Ciudad Juarez, Mexico and Fort Bliss, Texas. The Hueco Bolson receives limited natural recharge due to the arid climate. The 10 MGD Fred Hervey Reclamation Plant and the associated Hueco Bolson Recharge Project started full operation in 1985 and treats up to 7.5 MGD to drinking water standards for groundwater injection. The reclamation plant uses a 10-step treatment process including activated carbon, lime clarification, filtration and ozone disinfection.

Scottsdale, Arizona: City of Scottsdale Water Campus

Meeting the water supply demands of a growing city led to the creation of the Water Campus in Scottsdale, Arizona. Since 1998, the Water Campus has produced 12 MGD of tertiary treated recycled water that is used for golf course irrigation during the summer months. In winter, when irrigation is reduced, 10 MGD receives advanced purification at a state-of-the-art facility where microfiltration, reverse osmosis, and disinfection purify the water to drinking water standards before recharge into the local groundwater basin.

Los Angeles County-Area, California: Seawater Barrier Projects

Seawater intrusion is a natural and typical occurrence for all coastal aquifers around the world. Due to the severe over-draft of groundwater for potable and agricultural purposes in the Central and West Coast Basins (CWCB), seawater intrusion is contaminating the groundwater with salt and poses a serious threat to the local potable water source. To address this issue, fresh water consisting of imported and recycled water is injected into a well to build up pressure such that it overcomes the pressure of the intruding seawater, thereby blocking the intrusion. The Water Replenishment District of Southern California (WRD) currently manages three seawater intrusion barriers systems within Los Angeles County, all of which are operated by injecting imported potable or advanced purified water into a series of wells to maintain a freshwater barrier to protect against seawater intrusion. It is important to note that all seawater barrier projects are, in fact, potable reuse projects as well, as the injected water does eventually migrate into the drinking water source in the aquifer.

West Coast Seawater Barrier

The West Basin Municipal Water District's Edward C. Little Water Recycling Facility (ELWRF) in El Segundo, California, has been on-line since 1995. Secondary effluent from the City of Los Angeles Hyperion Treatment Facility is treated at the ELWRF to produce five different qualities of custom-made recycled water for irrigation, commercial and industrial use and groundwater recharge. For recharge, secondary treated effluent is purified by micro-filtration, reverse osmosis, and disinfected with UV disinfection. The advanced purified water is mixed with imported water prior to injection into the groundwater basin (West Coast) via a 100-well seawater barrier. Approximately 5,000 acre-feet of advanced purified water is injected into the seawater barrier annually.

Alamitos Seawater Barrier

The Alamitos Seawater Barrier receives recycled water from the Long Beach Water Reclamation Plant (LBWRP) that provides primary, secondary and tertiary treatment for 25 million gallons of wastewater per day. The plant serves a population of approximately 250,000 people. Approximately 5 million gallons per day of recycled water is reused at over 40 reuse sites for landscape irrigation of schools, golf courses, parks, and greenbelts by the City of Long Beach and the re-pressurization of oil-bearing sediment off the coast of Long Beach. A portion of the recycled water produced from the LBWRP undergoes advanced treatment at the Leo J. Vander Lans Advanced Water Treatment Facility. The facility uses microfiltration, reverse osmosis, and ultraviolet disinfection to produce high quality water that is blended with imported water and pumped into the Alamitos Seawater Barrier to protect the groundwater basin from seawater contamination. The WRD purchases all of the water injected into the barrier, except for about 2,500 acre-feet per year that is purchased by the Orange County Water District. In total, approximately 3,000 acre-feet of advanced purified water is injected into the seawater barrier annually.

Dominguez Seawater Barrier

The Dominguez Gap Barrier currently receives approximately 1,000 acre-feet per year of advanced purified water from the Los Angeles County Flood Control District (LACFCD) Terminal Island Water Reclamation Plant/Advanced Water Treatment Facility. They also operate and maintain the barrier. The plant treats wastewater from over 130,000 people and 100 businesses in the heavily industrialized Los Angeles Harbor area, including the communities of Wilmington, San Pedro, and a portion of Harbor City. The advanced purification facility can treat up to 4.5 MGD of tertiary effluent with microfiltration followed by reverse osmosis and chlorine disinfection. The advanced purified water meets all drinking water quality standards. It is also used as valuable boiler feed water for local industries in the Harbor area and offsets millions of gallons of potable water each day.

San Bernardino County, California: Chino Basin Groundwater Recharge Project

Water recycling is a critical component of the water resources management strategy for the Chino Basin in Southern California. Inland Empire Utilities Agency (IEUA) has implemented an aggressive water recycling program to complement dwindling imported water to meet its expanding needs. IEUA produces a very high quality recycled water that can be used for a wide variety of applications, including groundwater recharge, industrial process water, and irrigation of golf courses, freeway landscaping, pasture for animals and food crops. Presently, about 15 percent of the 60 MGD of water currently generated by the agency's four water recycling plants is reused locally each day. Recycled water received tertiary filtration and UV disinfection prior to conveyance and blending with stormwater flows in spreading basins prior to percolation into the groundwater basin.

Aurora, Colorado: Prairie Waters Project

Colorado's arid environment and cycles for drought make a drought-protected water supply a priority for many Colorado cities. Out of this need, the City of Aurora, Colorado developed the Prairie Waters Project. Anticipated to begin operation in 2011, the Prairie Water Project will increase the City's water supply by 20 percent, delivering up to 10,000 acre-feet (about 3.3 billion gallons) of advanced purified water per year. The project will draw river water from the South Platte River, a receiving water of treated wastewater effluent from wastewater treatment plants located upstream. The river water will be drawn through the sand and gravel of the riverbank and pumped to a 50 MGD water purification facility that treats the water using softening, advanced ultraviolet oxidation, filtration and granulized activated carbon adsorption. The advanced purified water will then be discharged into the Aurora Reservoir, the City's raw water storage reservoir. Water from the reservoir is treated again prior to distribution into the potable water distribution system.

<u>SIDEBAR</u>

Planned Versus Unplanned Potable Reuse Projects

Indirect potable reuse—using water a second time as a drinking water supply—occurs on both a planned and unplanned basis. San Diego's Water Purification Demonstration Project will demonstrate the safety associated with *planned* indirect potable reuse, which means that wastewater is purified to an extremely high level. The process includes state-of-the-art technological processes, including a combination of membrane filtration, reverse osmosis, and advanced oxidation.

Unplanned indirect potable reuse takes place on nearly every river system throughout the world, including the United States. Water that moves from an upstream community to one downstream varies in water quality depending on the quality of wastewater discharged along the way. So, treated wastewater is already being provided to many communities as part of their drinking water.

In the case of the City of San Diego, imported water from the Colorado River and Northern California contains treated wastewater discharged from a total of over 345 municipal wastewater facilities. All imported water and water collected in San Diego's reservoirs from rainfall is untreated or "raw" water. Before any of that water is sent to your tap, it is treated in a water treatment plant to ensure it is safe and healthy to drink – and that it meets all drinking water standards. San Diego could not exist without these imported water sources, which contain treated wastewater.

<u>References</u>

WateReuse. (n.d.). WateReuse Association website online glossary. Accessed on June 13, 2011. http://www.watereuse.org/information-resources/about-water-reuse/glossary-1

CITY OF SAN DIEGO WATER PURIFICATION DEMONSTRATION PROJECT
ADVANCED WATER PURIFICATION

It is commonly known that human activities over the years have resulted in contamination of our water bodies worldwide. Whether it's runoff from agricultural farms or health and beauty products we use daily to improve the quality of our lives, contaminants find their way into water bodies as a result of human activities. Many of these water bodies are used as public water supply sources. Recently, the public has become more aware about human activities and the associated impact of contaminants from those activities on water supplies, as well as the potential impacts of exposure to contaminants on both humans and wildlife. For more than a decade, water professionals and regulators have studied various contaminants, which are sometimes called "constituents of emerging concern" (CECs), because of their consistent occurrence in source waters throughout the United States and internationally.

While the presence of CECs is of concern, many of these compounds are not being detected as a result of recent events. Instead, the elevation of the level of compounds is a result of the improvement of our ability to detect them in the environment. In fact, our ability to detect CECs has outstripped our knowledge of what kind of impact they might actually have on humans. *Detection of these compounds does not necessarily imply a risk*. For example, typical concentrations of pharmaceuticals found in water supplies are millions of times lower than one therapeutic dose of that same pharmaceutical. In fact, the highest concentration of any pharmaceutical detected in U.S. drinking waters is approximately 5,000,000 times lower than the therapeutic dose (AWWA, 2008). Nonetheless, strategies have been developed to manage potential risks to the public.

The primary objective of water and wastewater treatment is to protect human health and promote economic vitality while minimizing adverse ecological impacts from the use of the water. Improved public health protection, through effective drinking water treatment, is one of the outstanding civil engineering accomplishments of the twentieth century. At the same time, advances in wastewater treatment have greatly reduced the ecological impacts of wastewater discharges.

While wastewater treatment has been shown to be an effective barrier at reducing CECs, many agencies have embraced the advanced purification of water that will find its way back to a public water supply. Advanced water purification has been proven to positively remove CECs and provide a superior water quality that meets all drinking water standards.

What is Advanced Water Purification?

Advanced Water Purification (AWP) is a state-of-the-art process that further purifies highly treated wastewater. After the wastewater is biologically treated and filtered, the water is considered to be high quality but is not considered suitable for drinking water. AWP involves several additional treatment steps that scientists and health professionals recognize will produce a very high quality water supply. The high quality of this water is achieved by filtering the water through membranes that remove CECs, which are much larger in size than the very small pores in the membrane material. A subsequent step involves advanced oxidation, the combination of hydrogen peroxide and ultraviolet light, which provides one of the most powerful oxidants on the planet to provide an additional barrier and disinfect the purified water. Analysis of the water produced by this process indicates that advanced water purification facilities consistently produce water with significantly lower concentrations of constituents than raw (untreated) imported water supplies.

What type of treatment is provided by Advanced Water Purification in the Demonstration Project?

This advanced water purification process includes membrane filtration (microfiltration and/or ultrafiltration), reverse osmosis, ultraviolet light disinfection, and advanced oxidation. These technologies have been utilized in the water industry for many decades, and are proven barriers that remove CECs and safeguard public health.

Microfiltration and Ultrafiltration

Microfiltration (MF) and ultrafiltration (UF) are types of filters that utilize fibers that resemble a sponge-like material when magnified. The pores, or openings in the fibers that allow the water to pass through, are 0.2 microns, which is approximately 300 times finer than one human hair. MF and UF are very effective at removing materials in the water, but not good at removing dissolved compounds or CECs. These filters are used to "polish" the water. This improves the operation of the reverse osmosis system that is very effective at removing CECs and dissolved materials.

Reverse Osmosis

Reverse osmosis is a membrane filtration method that removes compounds that are very small, such as dissolved salts, by using pressure to push water through a semi-permeable membrane, leaving other unwanted materials behind. The reverse osmosis membrane is designed to allow only water to pass through while preventing the passage of dissolved materials, such as salt. While these membranes have been used for years to desalinate seawater, they are also being used today to purify water by removing CECs from reuse supplies. The membrane essentially acts like a very fine filter that separates out any remaining minerals and pollutants, salts, viruses, bacteria, metals, pesticides and other materials, resulting in very high quality water. Many bottled water companies use reverse osmosis because of its proven purifying capability.

Ultraviolet Light Disinfection

Following reverse osmosis, water is treated by ultraviolet (UV) light as an additional barrier to CECs. The system is designed to deliver a dose of UV light significantly higher than natural UV from sunlight. This breaks the chemical bonds of the compound into their more natural elements like carbon or nitrogen. The UV system also provides disinfection of the water. Hospitals and dental offices utilize UV light to sterilize instruments.

Advanced Oxidation

The addition of hydrogen peroxide before the UV process creates an additional step called advanced oxidation, providing an additional or backup barrier to CECs. Many of the operating AWP facilities use advanced oxidation to target chemicals typically not found in reuse waters in San Diego. The other intended use of advanced oxidation is as a safety net to address any remaining trace chemicals, which are in extremely low concentrations and thus difficult to detect even with the improvements in analytical testing.

Water Quality Testing

Awareness of our impact on the environment has increased over the years, but this is particularly true in the last 10 years with the improved sensitivity in analytical testing. Decades ago, compounds could only be detected at the parts-per-million levels (one part compound to one million parts water). In the last ten years this has advanced to parts-per-billion. Now, with very sensitive equipment, we are able to detect compounds at the parts-per-trillion level, and are near the parts-per-quadrillion boundary. In fact, lab technicians have to wear special gloves, clothing and breathing filters in order avoid contaminating the samples of water they are testing. While this low level of detection is necessary for analytical purposes, it is not always necessary to determine a human health impact. Experts agree that just because a compound is detected doesn't mean there is an associated health concern.

While humans worldwide have sent many compounds into the environment, many of these compounds are of little health or environmental concern. For those compounds that are a health or environmental concern, the risk of their presence is balanced by the extremely low concentrations at which they occur. Improvements in wastewater treatment have resulted in a very effective barrier to the CECs that that are introduced into the water. Advanced water purification has been proven to be an extremely effective system at providing a superior quality of water that meets all drinking water standards.

If the Demonstration Project were to result in a decision to implement a full-scale project that would augment San Vicente Reservoir with purified water from the AWP, it would have one benefit that other similar projects do not possess. All of the other projects in Southern California use the purified water to supplement groundwater supplies and then pump that groundwater directly to the consumer's taps. A full-scale reservoir augmentation project would send the purified water from the AWP to the San Vicente Reservoir where it would blend with untreated water stored there. Ultimately the blended water would be sent to one of the City's water treatment facilities where it will be further treated before being sent into our drinking water system.

SIDEBAR

What can you do to help reduce pharmaceuticals in water supplies?

Pharmaceuticals and personal care products are products used by individuals for personal health or cosmetic reasons. They comprise a diverse collection of thousands of chemical substances, including prescription and over-the-counter therapeutic drugs, fragrances, soaps, lotions, and cosmetics. These products are considered pollutants when they enter the wastewater stream through such means as bathing or flushing unused or expired medications down the toilet. Many cities have established "take back" centers or, as with the City and County of San Diego, an annual "Take Back Day", for unused medications. Additionally, the City of San Diego Environmental Services Department recommends that medications and pharmaceuticals be securely packed and disposed of in the trash: http://www.sandiego.gov/environmental-services/ep/medical.shtml. You can help reduce pollution in our water supplies by returning unused or expired medicine to a center or by properly disposing in a landfill rather than flushing it down your toilet.

References

American Water Works Association (AWWA). 2008. *Statement of Dr. Shane Snyder, Southern Nevada Water Authority before the Senate Subcommittee on Transportation Safety, Infrastructure Security, and Water Quality on Pharmaceuticals in the Nation's Water: Assessing Potential Risks and Actions to Address the Issue.* April 15. Accessed on May 12, 2011. http://www.awwa.org/files/GovtPublicAffairs/AWWA2008FlyinTestimonyPharmaceuticals.pdf

Water Bill Insert

The latest version of the insert from March 2012 is displayed. A similar version was distributed in July 2011.

Open for Tours

Water Purification | Demonstration Project

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Tours Available

Explore San Diego's first water purification testing facility on a guided tour.

The Advanced Water Purification Facility is part of the City's Water Purification Demonstration Project, which is examining the use of advanced water purification technology on recycled water.

Experience the water purification process:

- See how wastewater becomes purified water
- See what other places are already drinking purified water
- See the comparison among purified, drinking, and recycled water

Signing up is easy:

- Email your request to PureWaterSD@sandiego.gov
- Call (619) 533-4631
- Register online at www.PureWaterSD.org/tours.shtml

Can't tour in person?

Schedule a presentation for your organization — email: PureWaterSD@sandiego.gov or call (619) 533-6638

www.PureWaterSD.org

The City of San Diego

Printed on recycled paper. This information is available in alternative formats upon request.

Abierto al Publico

Water Purification | Demonstration Project

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Recorridos disponibles

Explore en San Diego la primer instalacion de prueba de purificacion de agua en una visita con guia.

El Tratamiento Avanzado de Purificacion de Agua es parte del projecto de Demostracion de Purificacion de Agua, el cual esta investigando las tecnologias mas avanzadas para la purificacion de agua reciclada.

Conosca por experiencia propia el proceso de purificacion de agua:

- Vea como agua de desague se convierte en agua purificada
- Vea en que otros lugares se usa agua purificada como agua potable
- Vea la diferencia entre agua purificada, agua potable y agua reciclada

Apuntense Hoy:

- Visite www.purewatersd.org/tours.shtml para registrarse a un recorrido
- Mande un correo electronico a purewatersd@sandiego.gov o llame al (619) 533-4631

No puede asistir en persona?

Visite www.purewatersd.org para ver un guia virtual

Programe una presentacion para su organizacion- mande un correo electronic a purewatersd@sandiego.gov o llame al (619) 533-6638

www.PureWaterSD.org

THE CITY OF SAN DIEGO

AWP Facility Brochure

Demonstration Project Components

The Advanced Water Purification Facility is one component of the Demonstration Project. Additional components include a study of San Vicente Reservoir to determine the potential of augmenting the reservoir with purified water, an economic and energy analysis, and defining regulatory requirements. In addition, an independent advisory panel of experts provides oversight and guidance. The purified water will not be added to the San Vicente Reservoir during the demonstration phase; instead it will be added to the existing recycled water distribution system. For more information about the project or to schedule a speakers bureau presentation for your organization, visit www.purewatersd.org.

Take a Look

You are invited to tour the Advanced Water Purification Facility, the test facility for California's first indirect potable reuse via reservoir augmentation pilot project. During the walking tour you will see water purification technology up close and compare samples of purified water produced at the facility to tap and recycled water—the difference is clear.

Tours are held Tuesdays and Thursdays and on occasional evenings and Saturdays. To tour the facility, please register at www.purewatersd.org/tours.shtml or call (619) 533-4631.

Tasting is Believing

Orange County's Groundwater Replenishment System (GWR) is a full-scale advanced water purification facility located in Fountain Valley, California. The GWR System uses the same purification process being examined by the Demonstration Project to supply a safe and reliable water source to over 500,000 residents. As a full-scale facility, guests touring the GWR System are able to drink the purified water. To register for a tour, visit www.GWRSystem.com.

To tour the facility, please register at www.purewatersd.org/tours.shtml or call (619) 533-4631.

City of San Diego PUBLIC UTILITIES Water & Wastewater

City of San Diego
Public Utilities Department
600 B Street, Suite 600
San Diego, CA 92101

Project Information Line: (619) 533-7572
Project Speakers Bureau Line: (619) 533-6638
Email: purewatersd@sandiego.gov
Website: www.PureWaterSD.org

Water Purification Demonstration Project
@PureWaterSD
YouTube PureWaterSD

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A look at the technology behind the

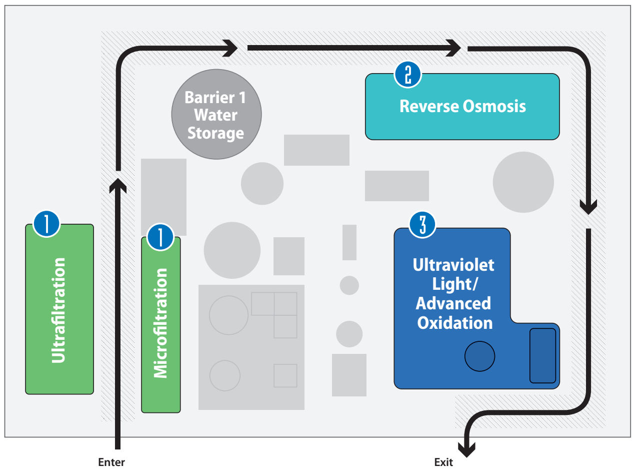
Water Purification | Demonstration Project

Exploring local resources to ensure a sustainable water supply

The City of San Diego

Innovation for Future Water Supply

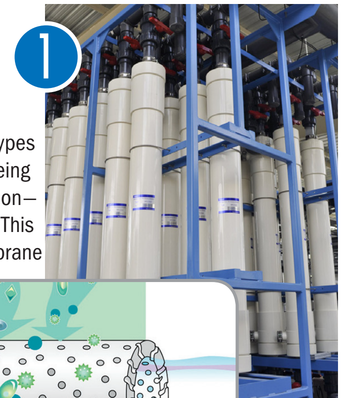
The Advanced Water Purification Facility is the focal point of the City of San Diego's Water Purification Demonstration Project (Demonstration Project). This project is vital to San Diego's future and is a critical step towards developing a local, sustainable and reliable water supply. This state-of-the-art facility, located at the North City Water Reclamation Plant, is using the most advanced technologies to purify one million gallons of recycled water per day.

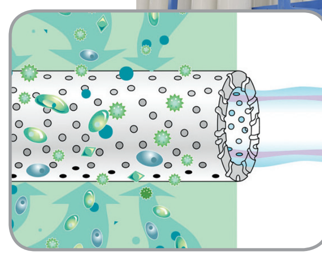


The Purification Process

The City of San Diego currently uses recycled water for irrigation and industrial purposes. The Demonstration Project is a pilot study to determine the feasibility of further purifying recycled water to supplement local drinking water supplies through reservoir augmentation. The project will determine if the purified water meets water quality, safety and regulatory requirements. The purification process uses the multi-barrier approach of consecutive treatment steps, which work together to remove or destroy unwanted materials. Each barrier includes frequent and continuous water quality monitoring. Safeguards are built into the process to ensure that an anomaly at any given treatment step would not compromise public health. Here is a look at the process:

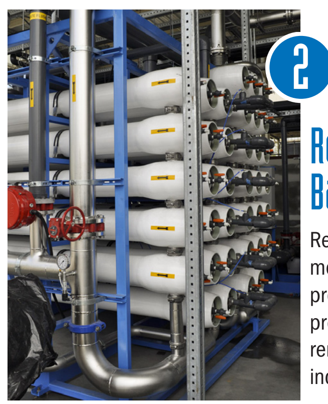
Membrane Filtration — Barrier 1





The first step in the water purification process is membrane filtration. Two types of membrane filtration systems are being tested—microfiltration and ultrafiltration—to determine which is most effective. This treatment step uses a series of membrane filtration canisters that remove contaminants in the already-treated recycled water.

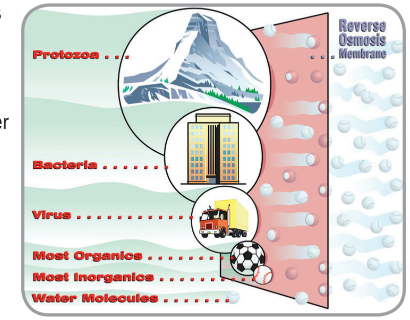
Inside the membrane filtration canisters are hollow fibers that block unwanted materials like suspended solids, bacteria and protozoa from passing through. The filters are extremely efficient and are tested daily to confirm their consistent removal of contaminants. After undergoing membrane filtration, the clouded appearance of the recycled water is converted into a clear solution that contains dissolved organic material and salts.



Reverse Osmosis — Barrier 2

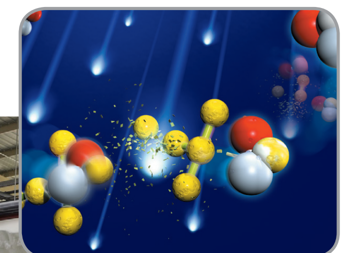
Reverse osmosis is the second and most essential step in the purification process. Water is forced under high pressure through membranes that remove salt and microorganisms, including viruses and bacteria.

Reverse osmosis purifies the water to a level similar to distilled water quality. This process is used by the bottled water industry.



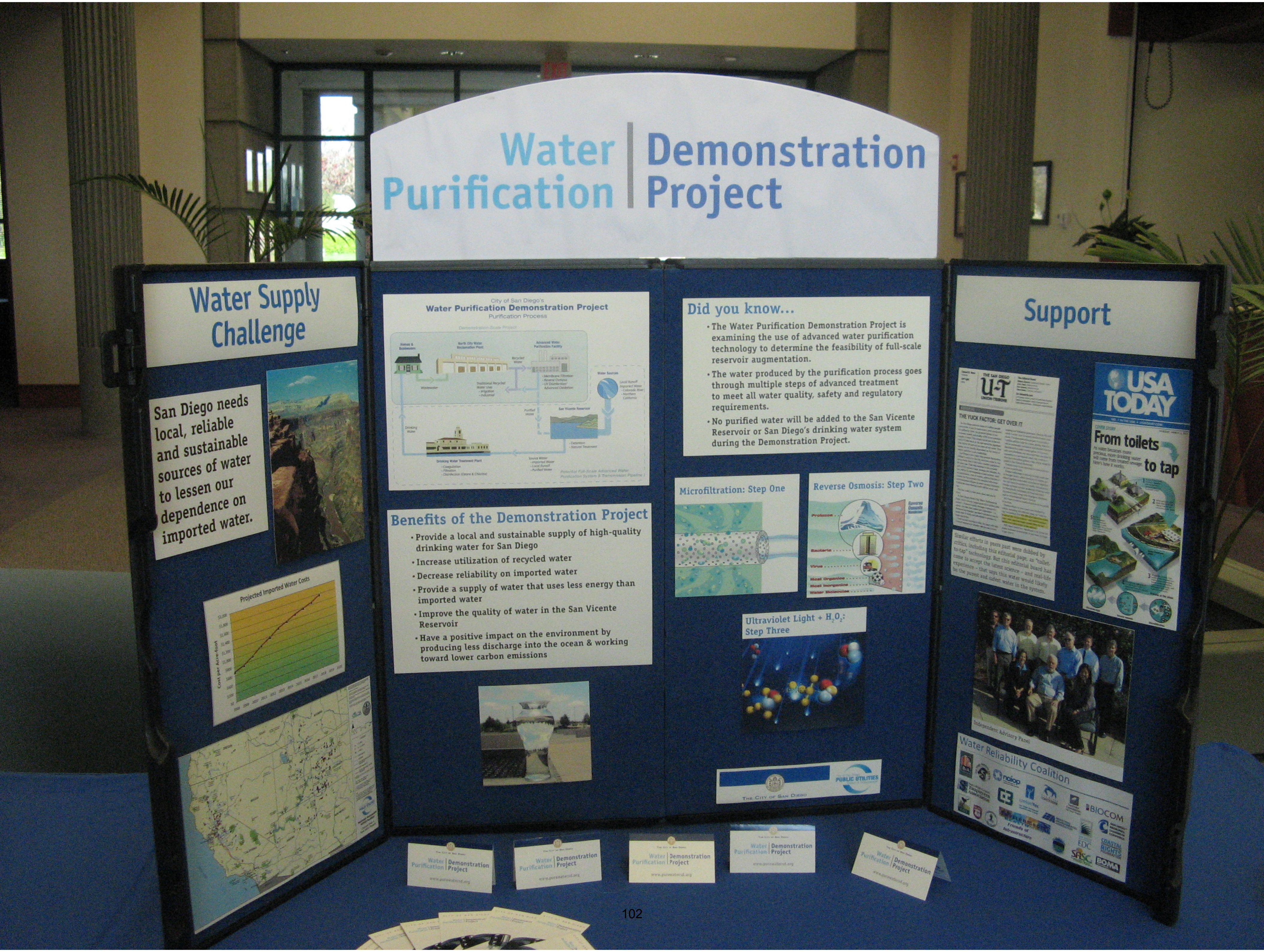
Ultraviolet Disinfection/Advanced Oxidation — Barrier 3

Step three of the purification process is advanced oxidation through the use of ultraviolet (UV) light and hydrogen peroxide. Inside the vessel shown to the right is a high intensity light, similar to extremely concentrated sunlight, that provides disinfection. Hydrogen peroxide is added and reacts with the light to form powerfully reactive molecules like those used by nature to clear pollutants from the atmosphere. These molecules provide further disinfection and destroy any remaining contaminants in the water by breaking them down into harmless compounds.



San Diego is among many innovative cities exploring water purification technology to purify wastewater for use as drinking water.

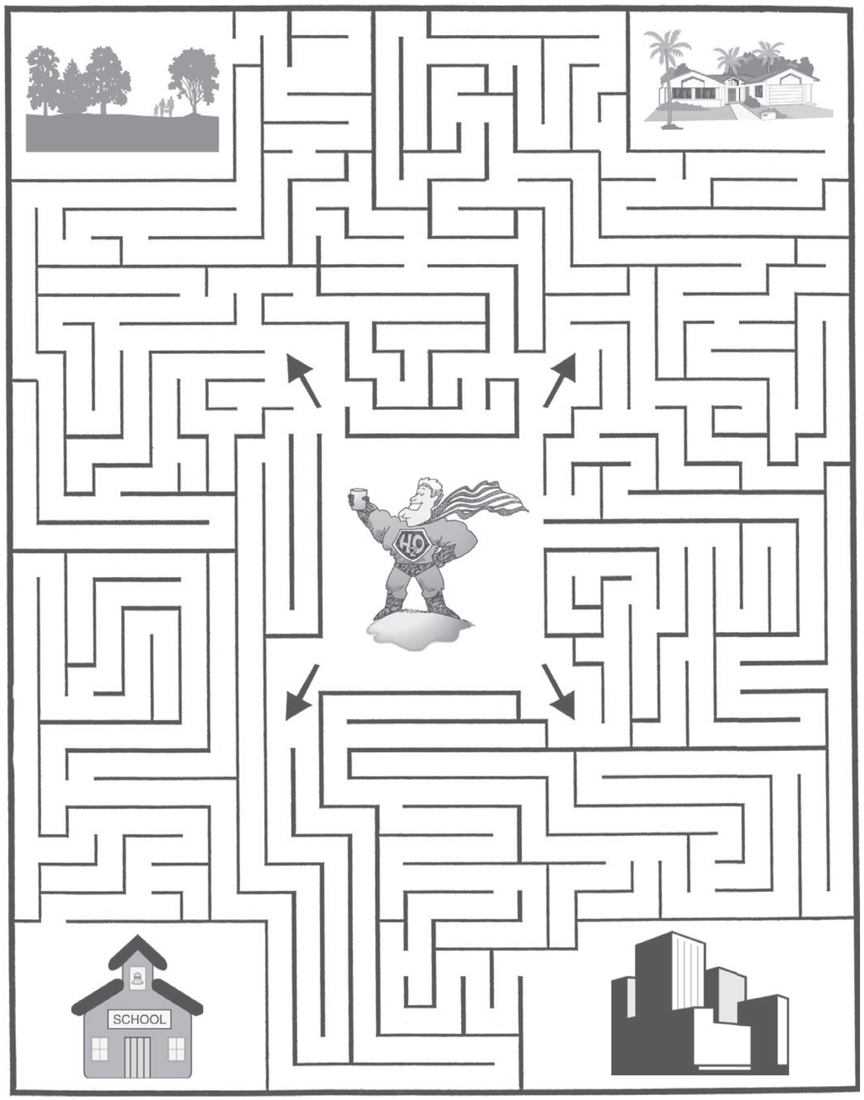
Display Board


Water Purification | Demonstration Project
Water Supply Challenge
San Diego needs local, reliable and sustainable sources of water to lessen our dependence on imported water.
Projected Imported Water Costs
City of San Diego's
Water Purification Demonstration Project
Purification Process
Benefits of the Demonstration Project
• Provide a local and sustainable supply of high-quality drinking water for San Diego
• Increase utilization of recycled water
• Decrease reliability on imported water
• Provide a supply of water that uses less energy than imported water
• Improve the quality of water in the San Vicente Reservoir
• Have a positive impact on the environment by producing less discharge into the ocean & working toward lower carbon emissions
Did you know...
• The Water Purification Demonstration Project is examining the use of advanced water purification technology to determine the feasibility of full-scale reservoir augmentation.
• The water produced by the purification process goes through multiple steps of advanced treatment to meet all water quality, safety and regulatory requirements.
• No purified water will be added to the San Vicente Reservoir or San Diego's drinking water system during the Demonstration Project.
Microfiltration: Step One
Reverse Osmosis: Step Two
Ultraviolet Light + H_2O_2: Step Three
The City of San Diego
Public Utilities
Support
U-T
THE YUCK FACTOR: GET OVER IT
USA TODAY
From toilets to tap
Independent Advisory Panel
Water Reliability Coalition
BIOCOM
EDC
BOMA

Children's Activity Page

Maze

Help our water superhero find his way to the park, home, school and business.



Water Purification Demonstration Project Activity Page

Test your Demonstration Project knowledge!

Water is essential for life. We need it for cooking, cleaning, bathing, watering lawns, and drinking! In San Diego, most of our water is imported, or brought in, from Northern California and the Colorado River. Importing water costs a lot of money. Also, many other people use the water before it gets to San Diego.

The City of San Diego is looking at ways to create a local water supply. With the Water Purification Demonstration Project, the City is testing whether the water San Diegans flush down their drains can be cleaned and used for drinking again. This activity page will help you learn more about the Water Purification Demonstration Project.

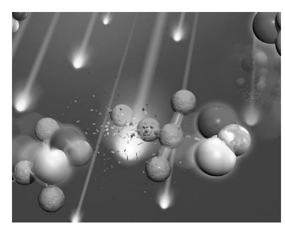
Match the Technology

Three technologies used in the Water Purification Demonstration Project are described below. Write the name of the technology underneath the matching picture.

Membrane filtration: Consists of "straws" with holes in the side that suck in the water and keep out the contaminants. The Demonstration Project uses microfiltration and ultrafiltration.

Reverse osmosis: Forces water through several sheets of thin plastic membranes to filter out anything bigger than a water molecule, such as minerals and contaminants. The RO membranes are like microscopic strainers.

Ultraviolet disinfection/advanced oxidation: Intense light, like sunlight, that works with hydrogen peroxide to zap any remaining contaminants in the water.



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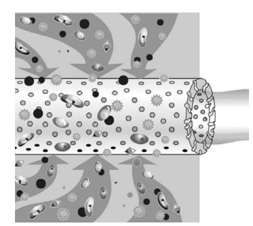

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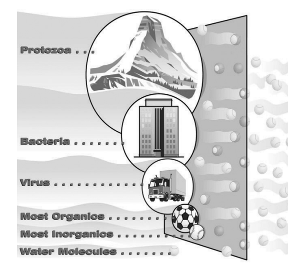
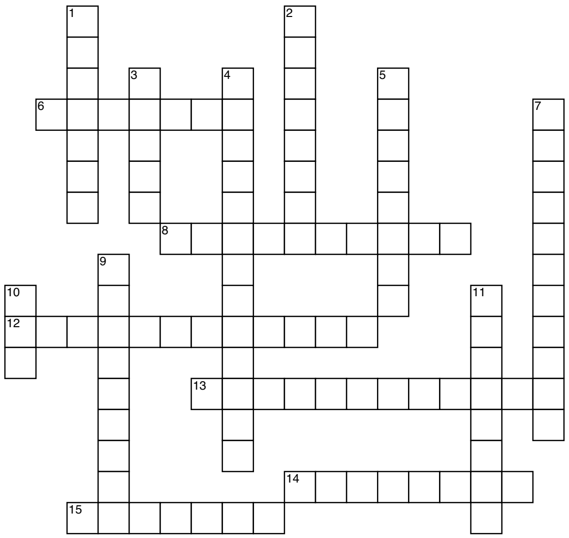


____

Crossword Puzzle



www.Puzzle-Maker.com

Determine the word that best fits the clues and definitions provided. Fill the word in the crossword puzzle.

ACROSS

6 _________ water. Another name for “drinking water.”

8 Untreated water collected in the sewer system from residences and businesses (e.g., from bathtubs, showers, bathroom sinks, clothes washers, toilets, kitchen sinks, and dishwashers).

12 A reduction in water waste. Saving water.

13 Removing or destroying microorganisms in water that may be harmful to humans.

14 _________ water. Wastewater that has undergone a high level of treatment at a reclamation facility so that it can be reused for a variety of purposes, such as irrigation and industrial use. This is the water that comes into the AWP Facility.

15 A period of time when rainfall is far below average.

DOWN

1 Reverse ________ (RO). A high-pressure membrane filtration process that forces water through several sheets of thin plastic membranes to filter out minerals and contaminants. The RO membranes are like microscopic strainers.

2 ________ filtration. A filtration process used to separate particles from the water. The Demonstration Project uses microfiltration and ultrafiltration.

3 _____ cycle. The movement of water as it evaporates from rivers, lakes or oceans, returns to the earth as precipitation, flows into rivers and evaporates again. This cycle is aided in urban areas by modern technology, which includes wastewater and drinking water treatment facilities.

4 Water Purification ______ Project. This test project is examining the use of water purification technology to provide safe and reliable water for San Diego's future.

5 _______ water. A water source that begins in one region and is transferred to another region. For example, San Diego's water comes from Northern California or the Colorado River.

7 A substance found in the water. Can be safe or unsafe.

9 A manmade lake or tank used to collect and store water.

10 Abbreviation for personal care products. Products that can be found in wastewater such as shampoos, fragrances, soap, and deodorant.

11 __________ water. The water that the AWP Facility produces. It starts as recycled water and is treated with membrane filtration, reverse osmosis and ultraviolet disinfection/advanced oxidation.

Word Search

Words related to the Water Purification Demonstration Project are hidden in the puzzle to the right. Find the Word Bank words in the puzzle. Words may go right, left, up, down, and diagonal.

WORD BANK:

ADVANCED
DEMONSTRATION
DISINFECTION
MEMBRANE
MICROFILTRATION
PURE
RECYCLED
REVERSE OSMOSIS
ULTRAVIOLET
WATER

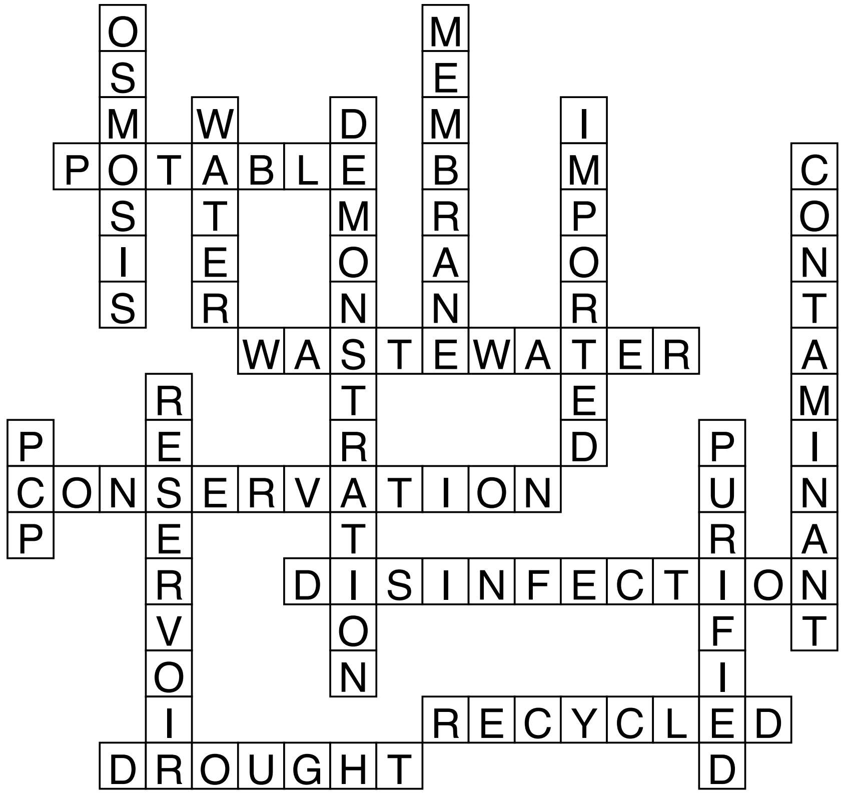
C	R	G	B	M	S	M	E	Y	Y	J	F	T	B	M
N	I	E	C	K	L	L	F	A	Y	B	E	K	I	T
O	O	C	C	V	Q	M	V	H	N	L	G	C	L	W
I	U	I	R	Y	T	I	F	H	O	R	R	L	O	W
T	M	T	T	U	C	C	H	I	F	O	A	B	A	X
C	D	C	L	A	A	L	V	Y	F	C	M	T	F	T
E	D	Z	M	J	R	A	E	I	C	U	E	F	X	L
F	E	R	U	P	R	T	L	D	A	R	M	Z	M	K
N	H	A	C	T	O	T	S	D	R	Q	B	U	I	W
I	E	K	L	C	R	K	T	N	U	R	R	Q	U	Y
S	W	U	M	A	B	C	R	Y	O	O	A	M	V	A
I	S	Z	T	Q	X	E	N	M	C	M	N	S	T	I
D	S	I	S	O	M	S	O	E	S	R	E	V	E	R
F	O	A	D	V	A	N	C	E	D	V	J	D	Y	K
N	G	D	S	E	Y	I	P	F	C	I	K	Q	S	I

Water Quiz

Below are statements about water. Some are true. Some are false.
Circle T if a statement is true and F if a statement is false.

	True/False
1. The water coming out of your faucet contains molecules that the dinosaurs drank.	T F
2. Most of San Diego's water supply comes from local rainfall.	T F
3. San Diego is at the end of the pipeline when importing water from the Colorado River and Northern California.	T F
4. The City of San Diego's “purple pipes” carry recycled water to use on lawns and for industries.	T F
5. Recycled water from the purple pipes is safe to drink.	T F
6. The Water Purification Demonstration Project is testing whether San Diego can purify recycled water and add the purified water to a local reservoir.	T F
7. A reservoir is a manmade lake or tank used for storing water.	T F
8. The Demonstration Project is using membrane filtration, reverse osmosis and ultraviolet disinfection to purify recycled water.	T F
9. San Diego is the first in the nation to use water purification technology.	T F
10. If you drink tap water at Disneyland, you are most likely drinking purified water.	T F

Solutions



Word Search:

```
+ + + + + + + + + + + + T + M
N + + + + + + + + + + + E + I +
O O + + + + + + + + + L + C + +
I + I + R + + + + O + R M + +
T + + T + E + + I + O + E + +
C + + + A + C V + F + + M + +
E + + + + + R A Y I + W + B + +
F + + + + + R T L C A + + R + +
N + + + + T + T S T L + + A + +
I + + L + R + E N + E + N + +
S + U + A + R + + O + D E + +
I + + T + + + + + + M + + + +
D S I S O M S O E S R E V E R
+ O + + A D V A N C E D D + +
N + + + + + E R U P + + + + +
```

(Over,Down,Direction)
ADVANCED(5,14,E)
DEMONSTRATION(13,14,NW)
DISINFECTION(1,13,N)
MEMBRANE(13,4,S)
MICROFILTRATION(15,1,SW)
PURE(10,15,W)
RECYCLED(5,4,SE)
REVERSEOSMOSIS(15,13,W)
ULTRAVIOLET(3,11,NE)
WATER(11,7,SW)

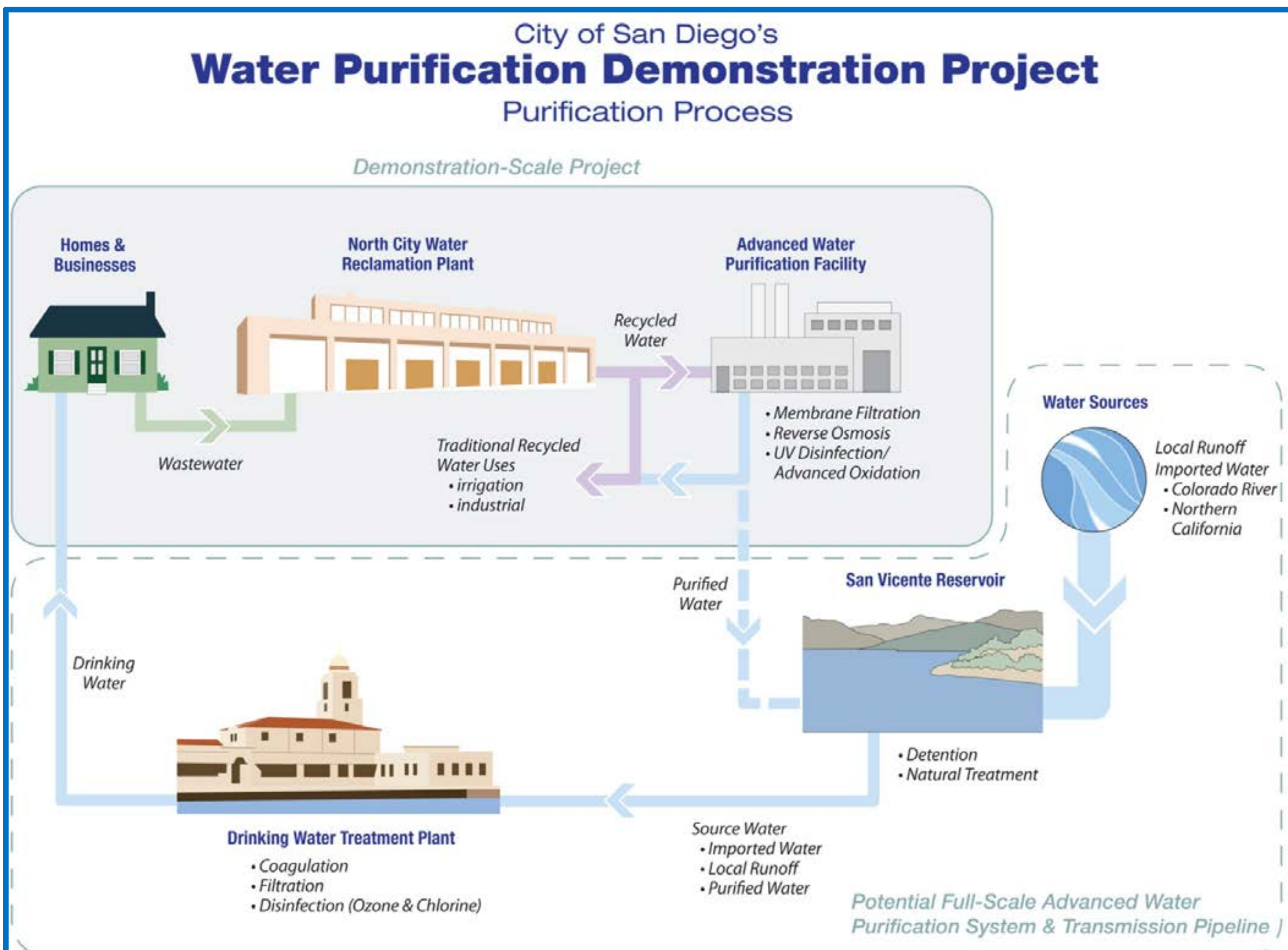
Water Quiz:

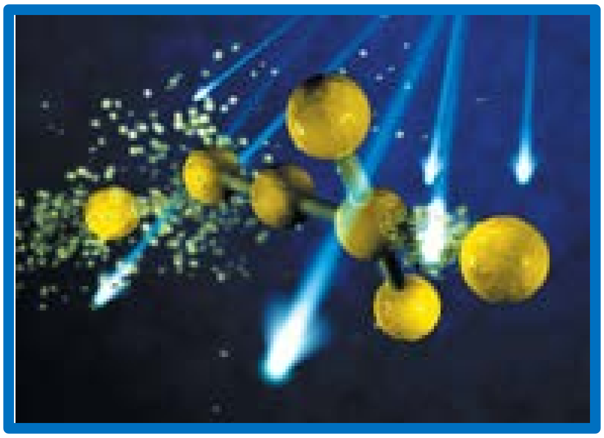
1. T, **2.** F, 80% is imported, **3.** T, **4.** T, **5.** F, recycled water needs further treatment to be safe for drinking, **6.** T, **7.** T, **8.** T, **9.** F, other communities have used this technology for years, **10.** T

Water Purification | Demonstration Project

Necesitamos agua potable para bebe, conicna, bañarnos, limpiar y regar. En San Diego, la mayoria de el abua proviene del norte de California y del rio Colorado. Como cuesta mucho dinero comprar esta agua, San Diego necesita su propia agua.

La cuidad de San Diego esta buscando mas agua y hacienda pruebas al agua que los san dieguinos mandan al drenaje par aver si se puede limpiar y usarse para usos domesticos. Esta pagina de actividades te ayudara a entender como funciona esto.





Iguala la Tecnologia

Descrito abajo son 3 tipos de tecnologia usadas en el projecto de Demostracion de Agua Purificada. Escribe el nombre de la tecnologia al lado de la foto.

Filtración de membrane- popotes con agujeros en los lados que chupan el agua dejando fuera contaminantes.

Osmosis Reversa- forza agua a travez de capas delgadas de membranas de plastic para filtrar cualquier cosa mas grande que una molecula de agua, como minerales y contaminantes. La osmosis inversa funciona como coladores microscopicos.

Desinfección ultravioleta/ oxidación avanzada- luz intense, como la luz natural, que trabaja con agua oxigenada para eliminar cualquier contaminante restante en el agua.

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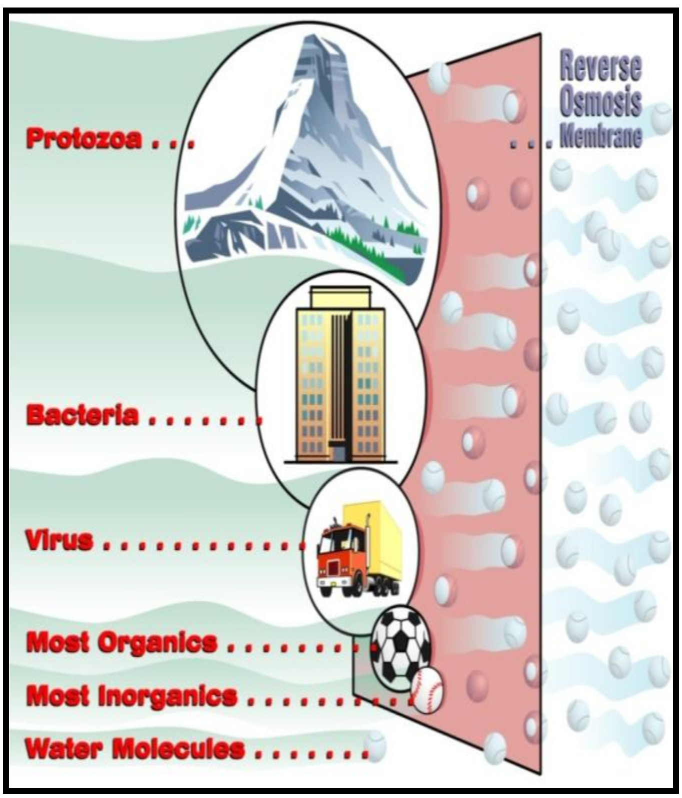

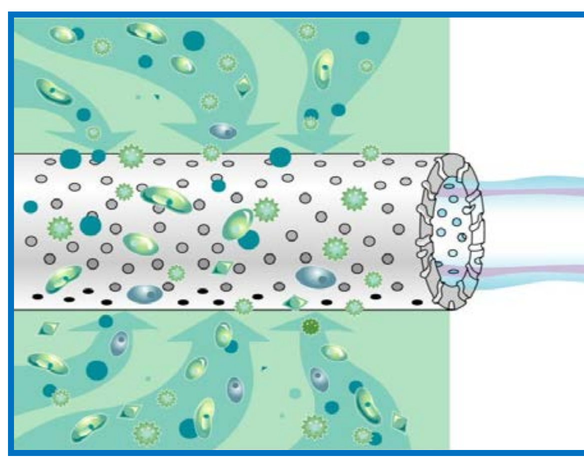

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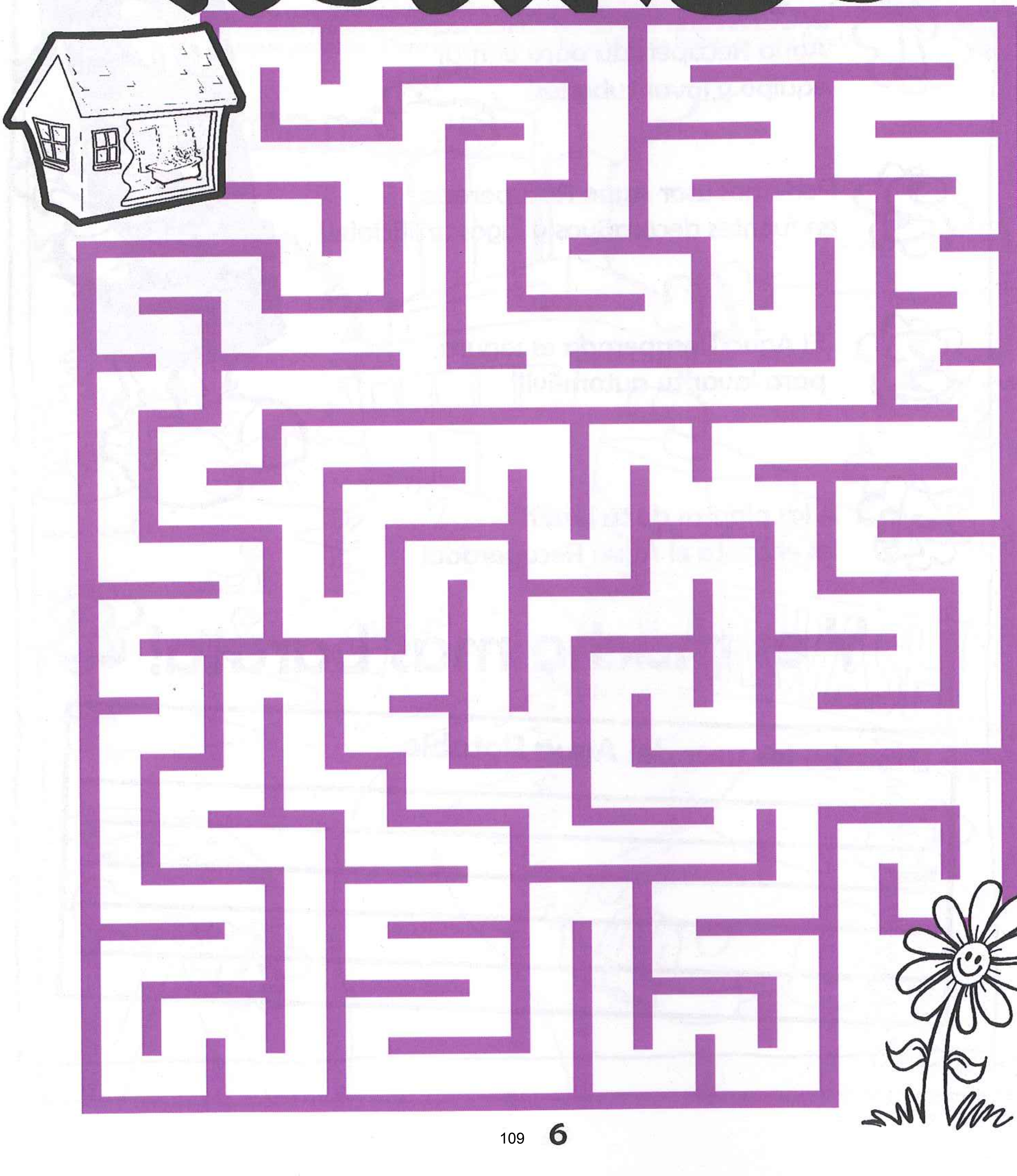
EL LABERINTO MORADO



PALABRAS RECUPERADAS

R	E	S	E	R	V	A	X	R	W	R	A
E	Z	S	X	E	W	Q	X	Z	Q	W	G
C	X	I	H	C	K	F	P	X	K	Z	U
L	L	U	V	I	A	E	I	Z	X	W	A
A	Q	Z	I	C	X	R	P	Z	W	X	N
M	X	Q	R	L	W	T	A	N	Q	U	E
A	Y	X	R	A	Q	I	S	Q	J	W	G
D	X	Q	I	R	Q	L	K	H	X	Q	R
A	T	X	G	Q	X	I	X	Z	L	Q	A
Q	X	Q	A	Y	Q	Z	X	W	X	W	X
X	K	T	R	A	T	A	D	A	X	Z	K
X	Q	W	X	Q	X	R	X	Y	Z	Q	R

RESERVA
LLUVIA
TANQUE
TRATADA
RECLAMADA
IRRIGAR
RECICLAR
FERTILIZAR
AGUA NEGRA
PIPAS

Iremos en la busqueda de las Palabras Recuperadas
Encuentra las palabras de la derecha en la sopa de letras
y encierralas en un circulo.
Pueden estar en forma horizontal ó vertical.

Videos

Demonstration Project videos can be found on the project's website. The videos and links are as follows:

- Virtual AWP Facility tour video
  http://granicus.sandiego.gov/ASX.php?publish_id=1257&sn=granicus.sandiego.gov
- Water purification process animation video
  http://granicus.sandiego.gov/ASX.php?publish_id=1207&sn=granicus.sandiego.gov
- The Science Behind the Water Purification Process (testimonial video)
  http://granicus.sandiego.gov/MediaPlayer.php?publish_id=1413
- The Benefits of the Water Purification Process (testimonial video)
  http://granicus.sandiego.gov/MediaPlayer.php?publish_id=1412
- Overcoming The Yuck Factor (testimonial video)
  http://granicus.sandiego.gov/MediaPlayer.php?publish_id=1417
- Support for the Demonstration Project (testimonial video)
  http://granicus.sandiego.gov/MediaPlayer.php?publish_id=1416

Appendix H: Public Outreach and Education

Section 3: Community Outreach and Tours

Community Events: Events Database

A list of events in which the Demonstration Project team participated.

Water Purification Demonstration Project
Community Event Involvement (October 2010 – October 2012)

- **Little Italy Festa** (Sunday, October 10, 2010)
- **Executive Square Green Fair** (Friday, October 29, 2010)
- **13th Annual San Diego Multicultural Festival** (Saturday, January 15, 2011)
- **Vietnamese Tet Festival** (Friday, January 28 - Sunday, January 30, 2011)
- **San Diego Chinese New Year Fair** (Saturday, February 12 - Sunday, February 13, 2011)
- **Heritage Weekend Festival and Parade** (Saturday, February 26, 2011)
- **Science Festival Expo** (Saturday, March 26, 2011)
- **Lao New Year** (Saturday, April 02 - Sunday, April 03, 2011)
- **EarthFair** (Sunday, April 17, 2011)
- **Qualcomm Earth Day Fair** (Friday, April 22, 2011)
- **City of San Diego's Take Your Daughters and Sons to Work Day** (Thursday, April 28, 2011)
- **Sally Ride Science Festival** (Saturday, May 14, 2011)
- **Scripps Ranch Green Fair** (Sunday, May 15, 2011)
- **RiverFest** (Sunday, May 15, 2011)
- **City of San Diego's National Public Works Week** (Monday, May 16 - Friday, May 20, 2011)
- **Fiesta Del Sol** (Saturday, August 13 - Sunday, August 14, 2011)
- **Mira Mesa Street Fair** (Saturday, September 17, 2011)
- **Politifest** (Saturday, September 17, 2011)
- **Filipino American Arts & Culture Festival (FilAm Fest)** (Saturday, October 01, 2011)
- **Wesley Methodist Church's Health Fair** (Saturday, October 08, 2011)
- **Serra Mesa Community Fair** (Saturday, October 15, 2011)
- **Girl Scouts World of Water Workshop** (Saturday, October 22, 2011)
- **SDSA High Tech Fair** (Tuesday, February 07 - Wednesday, February 08, 2012)
- **Greater San Diego Science and Engineering Fair** (Wednesday, March 21, 2012)
- **San Diego Science Festival Expo Day** (Saturday, March 24, 2012)
- **Rolando Street Fair** (Sunday, March 25, 2012)
- **Qualcomm Earth Day Event** (Wednesday, April 18, 2012)
- **Linda Vista Multicultural Festival** (Saturday, April 21, 2012)
- **EarthFair** (Sunday, April 22, 2012)
- **City of San Diego Celebrate the Earth** (Monday, April 23, 2012)
- **Scripps Research Institute Employee Fair** (Wednesday, April 25, 2012)
- **Take Your Sons and Daughters to Work Day** (Thursday, April 26, 2012)
- **BD Biosciences Earth Day Fair** (Friday, April 27, 2012)
- **Logan Heights Library Earth Day Event** (Saturday, April 28, 2012)
- **Clairemont Garden Tour & Expo** (Saturday, May 05, 2012)
- **Fiesta de los Penasquitos** (Sunday, May 06, 2012)
- **Scripps Ranch Community Fair** (Sunday, May 06, 2012)
- **Allied Gardens SpringFest** (Saturday, May 12, 2012)
- **Juneteenth Celebration** (Saturday, June 16, 2012)
- **San Diego Horticultural Society** (Monday, August 13, 2012)
- **Mira Mesa Street Fair** (Saturday, September 15, 2012)
- **Filipino American Arts & Culture Festival (FilAmFest)** (Saturday, October 06, 2012)

Community Events: Event Welcome e-blast

A template for the e-blast sent to Demonstration Project booth visitors at community events.

Water Reuse Program

Water Purification Demonstration Project

Quick Links

Water Purification Demonstration Project

City of San Diego

Sign up for emails

Forward email to a friend

Contact Us

(619) 533-7572

Water Purification | Demonstration Project

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

The City of San Diego

City of San Diego PUBLIC UTILITIES Water & Wastewater

The City of San Diego | Public Utilities Department

June 26, 2012

Dear [NAME],

Thank you for visiting our City of San Diego Water Purification Demonstration Project booth at the [EVENT] on [DATE]. As part of the City's effort to provide a local and sustainable water supply, the Demonstration Project is examining the use of water purification technology to provide safe and reliable water for San Diego's future.

Based on the information card you completed at the event, we have added you to our project's email list. We will keep you updated about the latest happenings with the Water Purification Demonstration Project. Your information will be used only for this project's outreach. Please be sure to add us to your safe senders so you can continue to receive our emails. If at any time you are no longer interested in learning about our project, please click "Unsubscribe" at the bottom of our emails.

Sincerely,

Danielle Thorsen
Community Outreach Specialist
San Diego Public Utilities Department
600 B Street, Suite 600
San Diego, CA 92101
Office: (619) 533-6606
DThorsen@sandiego.gov

Learn More

Tour the Advanced Water Purification Facility to get a closer look at water purification in action. Sign up for a tour at purewatersd.org/tours.shtml.

Can't make it out for a tour? Email purewatersd@sandiego.gov to request a Demonstration Project presentation for your group or to ask any project-related questions.

The Demonstration Project has been funded in part by grants from the U.S. Bureau of Reclamation and from a Proposition 50 grant administered by the California Department of Water Resources.

AWP Facility Tour Program: Tour Flier (full page)

Water Purification | Demonstration Project

A Site to See

Tours Available

Explore San Diego's first water purification testing facility on a guided tour.

Experience the water purification process:

- See how wastewater becomes purified water
- See what other places are already drinking purified water
- See the comparison of purified water, drinking water, and recycled water

Signing up is easy:

- Email your request to PureWaterSD@sandiego.gov
- Call (619) 533-4631
- Register online at www.PureWaterSD.org/tours.shtml

Scan this code to connect to our tour page!

How? Use your smartphone with a QR code reader. Open the code reader app and scan the code using your phone's camera.

Can't tour in person?

- View a virtual tour online at www.PureWaterSD.org
- Schedule a presentation for your organization — email PureWaterSD@sandiego.gov or call (619) 533-6638

AWP Facility Tour Program: Tour Flier (half page)

Open for Tours

Water Purification | Demonstration Project

Tours Available

Explore San Diego's first water purification testing facility on a guided tour.

Experience the water purification process:

- See how wastewater becomes purified water
- See what other places are already drinking purified water
- See the comparison of purified water, drinking water, and recycled water

Signing up is easy:

- Email your request to PureWaterSD@sandiego.gov
- Call (619) 533-4631
- Register online at www.PureWaterSD.org/tours.shtml

Can't tour in person?

- View a virtual tour online at www.PureWaterSD.org
- Schedule a presentation for your organization — email PureWaterSD@sandiego.gov or call (619) 533-6638

The City of San Diego

City of San Diego PUBLIC UTILITIES Water & Wastewater

The City of San Diego Public Utilities Department
(619) 533-7572 • www.PureWaterSD.org

Printed on recycled paper.
This information is available in alternative formats upon request.

AWP Facility Tour Program: Facility Graphics and Layout

AWP Facility Layout and Graphics

AWP Facility Tour Program: Tour List

List of tours from June 2011 through December 2012.

AWP Facility Tours
(June 2011 - December 2012)

Date	Time	Tour Group	Attendance
06/06/11	All day	Independent Advisory Panel	29
06/08/11	8:30 - 9:30 a.m.	Public Utilities Executive Staff	15
06/09/11	10 - 11 a.m.	Public Utilities Staff	9
06/09/11	11 a.m. - 12 p.m.	Public Utilities Staff	9
06/29/11	9 - 10 a.m.	American Assembly & Water Reliability Coalition	6
06/29/11	10 - 11 a.m.	American Assembly & Water Reliability Coalition	7
06/29/11	11 a.m. - 12 p.m.	American Assembly & Water Reliability Coalition	8
06/29/11	1 - 2 p.m.	American Assembly & Water Reliability Coalition	4
06/29/11	2 - 3 p.m.	American Assembly & Water Reliability Coalition	2
07/05/11	10 - 11 a.m.	Elected officials and water industry members	4
07/05/11	11 a.m. - 12 p.m.	Elected officials and water industry members	6
07/05/11	2 - 3 p.m.	Elected officials and water industry members	2
07/06/11	10 - 11 a.m.	Elected officials and water industry members (Councilmember Alvarez)	10
07/06/11	11 a.m. - 12 p.m.	Elected officials and water industry members	4
07/07/11	10 - 11 a.m.	Elected officials and water industry members	4
07/07/11	2 - 3 p.m.	Elected officials and water industry members (Councilmember Faulconer)	15
07/08/11	All day	Recycled Water Study	10
07/12/11	10 - 11 a.m.	Elected officials and water industry members	12
07/12/11	11 a.m. - 12 p.m.	Elected officials and water industry members	5
07/12/11	1 - 2 p.m.	Elected officials and water industry members	5
07/12/11	3:30 - 4:30 p.m.	Mayor's Office	13
07/14/11	10 - 11 a.m.	Elected officials and water industry members	11
07/14/11	1 - 2 p.m.	Elected officials and water industry members	4
07/14/11	2 - 3 p.m.	Elected officials and water industry members	11
07/19/11	10 - 11 a.m.	General public	9
07/19/11	11:30 a.m. - 12:30 p.m.	General public	10
07/20/11	11 a.m. - 12 p.m.	Elementary Institute of Science	16
07/21/11	10 - 11 a.m.	General public	18
07/21/11	11:30 a.m. - 12:30 p.m.	General public	4
07/23/11	11 a.m. - 12 p.m.	National University	14
07/26/11	10 - 11 a.m.	General public	14
07/26/11	11:30 a.m. - 12:30 p.m.	General public	6
07/27/11	5 - 6 p.m.	CWEA	13
07/27/11	6 - 7 p.m.	General public	11
07/28/11	10 - 11 a.m.	General public	9
07/28/11	11:30 a.m. - 12:30 p.m.	SABIT Group	13
08/02/11	10 - 11 a.m.	General public	19
08/02/11	11:30 a.m. - 12:30 p.m.	General public	12
08/04/11	10 - 11 a.m.	General public	10
08/04/11	11:30 a.m. - 12:30 p.m.	General public	10
08/04/11	2 - 3 p.m.	Councilmember Lightner	9
08/09/11	10 - 11 a.m.	General public	13
08/09/11	6 - 7 p.m.	General public	13
08/11/11	10 - 11 a.m.	General public	13
08/11/11	11:30 a.m. - 12:30 p.m.	General public, IEA	21
08/16/11	10 - 11 a.m.	General public	5
08/16/11	11:30 a.m. - 12:30 p.m.	General public	6
08/17/11	10 - 11:30 a.m.	WateReuse Association	30
08/18/11	10 - 11 a.m.	General public	12
08/18/11	11:30 a.m. - 12:30 p.m.	General public	6
08/20/11	11 a.m. - 12 p.m.	General public	17

AWP Facility Tours
(June 2011 - December 2012)

Date	Time	Tour Group	Attendance
08/22/11	3 - 4 p.m.	Councilmember Gloria	2
08/23/11	10 - 11 a.m.	General public	12
08/23/11	11:30 a.m. - 12:30 p.m.	General public	12
08/25/11	10 - 11 a.m.	General public	13
08/25/11	11:30 a.m. - 12:30 p.m.	General public	7
08/30/11	10 - 11 a.m.	General public	14
08/30/11	11:30 a.m. - 12:30 p.m.	General public	15
08/31/11	3 - 4:30 p.m.	Ambler Tours	47
08/31/11	5 - 6 p.m.	Audubon Society	12
09/01/11	8:30 - 9:30 a.m.	U.S. Bureau of Reclamation	5
09/01/11	10 - 11 a.m.	General public	13
09/01/11	11:30 a.m. - 12:30 p.m.	General public	5
09/02/11	9 - 10 a.m.	U.S. Bureau of Reclamation	5
09/06/11	10 - 11 a.m.	City of San Diego staff	9
09/06/11	1 - 2 p.m.	City of San Diego staff	14
09/06/11	9 - 10 a.m.	City of San Diego staff	8
09/06/11	11 a.m. - 12 p.m.	City of San Diego staff	10
09/08/11	11:30 a.m. - 12:30 p.m.	General Public	8
09/09/11	4:15 p.m.	Water Education Foundation	42
09/13/11	10 - 11 a.m.	General public	6
09/14/11	9 - 10 a.m.	Kipp Elementary School	65
09/14/11	11:30 a.m. - 12:30 p.m.	Home school group	21
09/15/11	9:30 - 11 a.m.	Kipp Elementary School	36
09/15/11	11:30 a.m. - 12:30 p.m.	General public	1
09/15/11	6 - 7 p.m.	General public	4
09/19/11	2 - 3 p.m.	Home school group	5
09/20/11	10 - 11 a.m.	General public	16
09/20/11	1 - 2 p.m.	Scripps Intitute of Oceanography	17
09/22/11	10 - 11 a.m.	General public	10
09/22/11	11:30 a.m. - 12:30 p.m.	General public	16
09/24/11	11 a.m. - 12 p.m.	General public	7
09/27/11	9 - 10 a.m.	City of San Diego staff	11
09/27/11	10 - 11 a.m.	City of San Diego staff	11
09/27/11	11 a.m. - 12 p.m.	City of San Diego staff	20
09/27/11	1 - 2 p.m.	City of San Diego staff	5
09/29/11	10 - 11 a.m.	General public	10
09/29/11	11:30 a.m. - 12:30 p.m.	General public	5
10/03/11	11 a.m. - 12 p.m.	City of San Diego staff	11
10/04/11	9:30 - 11 a.m.	High Tech High School	41
10/06/11	10 - 11 a.m.	General Public	6
10/08/11	11 a.m. - 12 p.m.	General Public	10
10/08/11	12:30 - 1:30 p.m.	Elementary Institute of Science	7
10/11/11	9 - 10 a.m.	Asian Business Association	6
10/13/11	10 - 11 a.m.	City of San Diego staff	11
10/17/11	10 - 11 a.m.	San Diego County Grand Jury	10
10/17/11	11 a.m. - 12 p.m.	Coachella Valley Water District	5
10/18/11	6 - 7 p.m.	Boy Scouts Den	17
10/19/11	1 - 2 p.m.	Mesa College Sustainability Class	13
10/19/11	3 - 4 p.m.	Thomas Jefferson School of Law Environmental Class	12
10/20/11	10 - 11 a.m.	General Public	3
10/27/11	10 - 11 a.m.	General Public	5

AWP Facility Tours
(June 2011 - December 2012)

Date	Time	Tour Group	Attendance
11/01/11	9:30 - 11 a.m.	Pacific Beach Elementary School	42
11/03/11	11:30 a.m. - 12:30 p.m.	General Public	6
11/05/11	10 - 11 a.m.	General Public	5
11/05/11	11:30 a.m. - 12:30 p.m.	Cub Scouts	32
11/08/11	10:30 a.m. - 12:30 p.m.	King-Chavez High School	59
11/09/11	10 - 11 a.m.	Assemblymember Fletcher and General Public	7
11/09/11	11 a.m. - 12 p.m.	Home school group	26
11/09/11	1 - 2 p.m.	UCSD Medical School and United Utilities	18
11/10/11	10 - 11 a.m.	SDSU Water Quality Investigation class	11
11/10/11	11:30 a.m. - 12:30 p.m.	Southwestern College class	14
11/17/11	11:30 a.m. - 12:30 p.m.	General Public	5
11/29/11	10 - 11 a.m.	General Public	10
11/29/11	11:30 a.m. - 12:30 p.m.	General Public	9
11/29/11	2 - 3 p.m.	La Jolla Village Greening Taskforce	21
12/02/11	11 a.m. - 12 p.m.	City of Los Angeles and General Public	4
12/02/11	12:30 - 1:30 p.m.	Catfish Club	13
12/08/11	10 - 11:30 a.m.	Pacific Beach Elementary School	42
12/10/11	10 - 11 a.m.	General Public	17
12/10/11	11:30 a.m. - 12:30 p.m.	Boy Scouts Den and Girl Scouts Troop	19
12/13/11	9:30 - 10:30 a.m.	Mexican government delegation	6
12/28/11	10 - 11 a.m.	Council District 4 staff	5
12/29/11	9:30 - 11:30 a.m.	Indian Nationals	2
01/09/12	10 - 11 a.m.	Conservation Action Committee	24
01/10/12	9:30 - 11:30 a.m.	San Diego Community College Older Adult Program	62
01/12/12	11:30 a.m. - 12:30 p.m.	Scripps Research Institute Toastmasters and Public	13
01/13/12	1:30 - 2:30 p.m.	Councilmember Emerald and Assemblymember Block's staff	10
01/17/12	10 - 11 a.m.	General Public	7
01/18/12	10 - 11 a.m.	UCSD Medical School	7
01/21/12	10 - 11 a.m	Association of Hazardous Materials Professionals (PSW CHMM)	8
01/21/12	11:30 a.m. - 12:30 p.m.	416th Civil Affairs Battalion (Airborne)	25
01/24/12	11:30 a.m. - 12:30 p.m.	Allied Gardens Optimist Club and General Public	11
01/26/12	1:30 - 2:30 p.m.	California Water Environment Association and General Public	8
01/27/12	9:30 - 10:30 a.m.	Santa Clara Valley Water District	4
02/07/12	10 - 11 a.m.	General Public	10
02/09/12	10 - 11 a.m.	General Public	6
02/09/12	11:30 a.m. - 12:30 p.m.	General Public	1
02/11/12	10 - 11 a.m.	General Public	21
02/11/12	11:30 a.m. - 12:30 p.m.	Society of Women Engineers and General Public	13
02/21/12	10 - 11 a.m.	Iraqi Delegation	6
02/23/12	10 - 11 a.m.	General Public	7
02/28/12	11:30 a.m. - 12:30 p.m.	Francis Parker Upper School AP Environmental Science Class	17
03/01/12	10 - 11 a.m.	General Public	5
03/10/12	10 - 11 a.m.	Cuyamaca College	34
03/10/12	12 - 1 p.m.	Mensa Playgroup	17
03/15/12	11:30 a.m. - 1:30 p.m.	American Society of Mechanical Engineers	10
03/16/12	9 - 10 a.m.	Council President Young and Councilmember Zapf	4
03/16/12	11 a.m. - 12 p.m.	Point Loma Rotary Club	17
03/16/12	1 - 2 p.m.	Assemblymember Toni Atkins	2
03/20/12	10 - 11 a.m.	City of San Diego staff	17
03/20/12	11 a.m. - 12 p.m.	City of San Diego staff	17
03/22/12	11:30 a.m. - 12:30 p.m.	General public	4

AWP Facility Tours
(June 2011 - December 2012)

Date	Time	Tour Group	Attendance
03/27/12	10 - 11:15 a.m.	White Sands La Jolla	11
03/29/12	10 - 11 a.m.	General Public	4
03/29/12	11:30 a.m. - 12:30 p.m.	General public	11
04/02/12	9:30-10:30	Public Utilities Mentorship Group	11
04/03/12	10 - 11 a.m.	San Diego Job Corps	33
04/03/12	11:30 a.m. - 12:30 p.m.	General public	8
04/05/12	10 - 11 a.m.	General public	6
04/11/12	6 - 7 p.m.	General public	6
04/12/12	10 - 11 a.m.	SDSU Osher Institute	23
04/12/12	11:30 a.m. - 12:30 p.m.	General public	5
04/14/12	10 - 11 a.m.	Boy Scouts	18
04/14/12	11:30 a.m. - 12:30 p.m.	Presbyterian Windjammers	16
04/24/12	11:30 a.m. - 12:30 p.m.	General public	10
04/26/12	10 - 11 a.m.	UCSD Pharmacology Lab	14
05/01/12	10 - 11 a.m.	SCAP Water Issues Committee	10
05/01/12	11:30 a.m. - 12:30 p.m.	National University	9
05/01/12	1:30 - 2:30 p.m.	Brazilian delegates	2
05/03/12	3 - 4 p.m.	Bureau of Reclamation & Senate Committee	4
05/12/12	10 - 11 a.m.	Girl Scouts	14
05/12/12	10:30 - 11:30 a.m.	General public	9
05/12/12	11 a.m. - 12 p.m.	General public	9
05/12/12	12:30 - 1:30 p.m.	General public	6
05/17/12	10-11 a.m.	Comision Estatal de Servicios Publicos de Tijuana	14
05/22/12	10-11 a.m.	Environmental Health Advisory Board	7
05/24/12	10-11 a.m.	All Hallows Academy	24
05/25/12	9:45-10:45 a.m.	Congressman Bob Filner	2
05/29/12	9:30-10:30 a.m.	Lincoln High School	16
05/29/12	11 a.m.-12 p.m.	All Hallows Academy	28
05/31/12	10-11 a.m.	SDCWA and Member Agency Officials	14
06/03/12	1:30-3:30 p.m.	WateReuse Conference Attendees	30
06/05/12	11:30 a.m. - 12:30 p.m.	General Public	16
6/122012	10-11 a.m.	General Public	6
06/14/12	11:30 a.m. - 12:30 p.m.	General Public	10
06/20/12	6 p.m. - 7 p.m.	Sustainability Committee	18
06/21/12	11:30 a.m. - 12:30 p.m.	General Public	6
06/23/12	10-11 a.m.	General Public	15
06/26/12	11-12 p.m.	General Public	8
07/16/12	12:30 - 1:30 p.m.	Assemblymember Atkins Stakeholder	8
07/16/12	1:30 - 2:30 p.m.	SDCWA Mentorship Group	8
07/18/12	11-12 p.m.	Retirement Club	16
07/19/12	9:30 -10:30 a.m.	General Public	21
07/20/12	10 a.m. - 1 p.m.	CUWA Board	8
07/21/12	10-11 a.m.	General Public	4
07/24/12	6-7 p.m.	General Public	3
07/26/12	11:30 a.m. - 12:30 p.m.	Councilmember DeMaio staff and General Public	5
08/07/12	11:30 a.m. - 12:30 p.m.	EMWD and General Public	14
08/10/12	11:30 a.m. - 12:30 p.m.	International Symposium	16
08/16/12	11:30 a.m. - 12:30 p.m.	Torrey Pines Ski Club	9
08/18/12	10-11 a.m.	Girl Scouts	13
08/18/12	11:30 a.m. - 12:30 p.m.	General Public	6
08/22/12	6:30 p.m. - 7:30 p.m.	Coalition of Neighborhood Councils	12

AWP Facility Tours
(June 2011 - December 2012)

Date	Time	Tour Group	Attendance
08/27/12	3-4 p.m.	Australian delegates and Councilmember-elect Kersey	3
08/29/12	11:30 a.m. - 12:30 p.m.	Women's Environmental Council	15
08/30/12	3 - 4 p.m.	South Jordan, Utah, & Councilmember Alvarez's staff	10
09/13/12	10-11 a.m.	San Diego Christian Home School Group	27
09/13/12	11:30 a.m. - 12:30 p.m.	General Public	6
09/22/12	11:30 a.m. - 12:30 p.m.	General Public	14
09/26/12	9:30 a.m. - 10:30 a.m.	Kipp Adelante Preparatory Academy	33
09/26/12	10:30 a.m. - 11:30 a.m.	Kipp Adelante Preparatory Academy	28
09/26/12	11:30 a.m. - 12:30 p.m.	Kipp Adelante Preparatory Academy	24
09/26/12	1 p.m. - 2 p.m.	General Public	4
09/27/12	11:30 a.m. - 12:30 p.m.	Olympian High School	12
09/29/12	8 a.m. - 9 a.m.	Healthy Hair Project and Business Bootcamp	25
09/29/12	9:30 a.m. - 10:30 a.m.	SDSU Dept of Geography Water Resources class	11
10/06/12	11 a.m. - 12 p.m.	Cuyamaca College	22
10/09/12	8:30 - 11:30 a.m.	CA-NV AWWA Conference	25
10/09/12	2 - 5 p.m.	Profs. Mujeriego and Asano	2
10/11/12	1 p.m. - 2 p.m.	EMTS (Public Utilities employees)	30
10/11/12	2 p.m. - 3 p.m.	EMTS (Public Utilities employees)	18
10/17/12	11 a.m. - 12 p.m.	UCSD Medical Students	12
10/18/12	10 a.m. - 11 a.m.	Intetnational Society of Automation EXPO	5
10/18/12	11:30 a.m. - 1 p.m.	Kearny High School AP environmental science class	42
10/25/12	3 - 4 p.m.	San Jose Silicon Valley Chamber of Commerce	27
10/26/12	9:30 - 10:30 a.m.	San Diego County of Educators	18
10/30/12	10 - 11:30 a.m.	Serra High School AP Environmental Science class	32
11/01/12	10 - 11:30 a.m.	Serra High School AP Environmental Science class	51
11/02/12	10 - 11 a.m.	Museum School, 6th grade class	32
11/03/12	10 - 11 a.m.	Sustainable Scripps Ranch	9
11/08/12	10 - 11:30 a.m.	SDSU Water Quality Investigation class	19
11/09/12	9:45-11:15	Museum School, 7th grade class	29
11/09/12	11:30 a.m. - 12:30 p.m.	SDSU ASCE members	5
11/14/12	9:30 a.m. - 10:30 a.m.	California Association of Resource Conservation District conference attendees	9
11/14/12	11 a.m. - 12 p.m.	General Public	5
11/28/12	2 p.m. - 3 p.m.	General Public	4
11/28/12	3:30 p.m. - 4:30 p.m.	Girl Scouts	15
12/04/12	10:30 - 11:30 a.m.	California Department of Public Health	18
12/07/12	11:30 a.m. - 12:30 p.m.	UCSD and Public Utilities staff	6
12/08/12	10 a.m. - 11 a.m.	Girl Scouts	14
12/13/12	10 a.m. - 11 a.m.	Public Utilities Staff	6
12/13/12	11 a.m. - 12 p.m.	Public Utilities Staff	7

Total number of tour attendees: **3244**

AWP Facility Tour Program: Tour Thank You e-blast

A template for the e-blast sent to AWP Facility tour guests following their visit.

Having trouble viewing this email? Click here

You're receiving this email because you have expressed interest in the City of San Diego's Water Purification Demonstration Project. Please confirm your continued interest in receiving email from us. To ensure that you continue to receive emails from us, add purewatersd@sandiego.gov to your address book today.

You may unsubscribe if you no longer wish to receive our emails.

Water Reuse Program

Water Purification Demonstration Project

Quick Links

Water Purification Demonstration Project

City of San Diego

Sign up for emails

Forward email to a friend

Contact Us

(619) 533-7572

Water Purification | Demonstration Project

The City of San Diego's water resource strategy includes planning, conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.

The City of San Diego

City of San Diego PUBLIC UTILITIES Water & Wastewater

The City of San Diego | Public Utilities Department

Dear (Contact First Name),

Thank you for visiting the City of San Diego's Advanced Water Purification Facility on [DATE]. As you witnessed firsthand during the tour, the City's Water Purification Demonstration Project is examining the use of water purification technology to provide safe and reliable water for San Diego's future.

Visit our Facebook page to view your group's photo from the tour. If you were unable to join us for your scheduled tour on [DATE], we hope you will join us for an upcoming tour by registering at purewatersd.org/tours.shtml.

If you have friends or family who may be interested in learning more about this potential source of water, please encourage them to register for a tour at purewatersd.org/tours.shtml. We also welcome you to email us at purewatersd@sandiego.gov to request a presentation about the project for your group or organization.

Want to support a full-scale water purification project in San Diego? Contact us to learn more.

Thank you again for your interest in the Demonstration Project. We hope that you found the tour to be valuable and informative.

Sincerely,
Marsi A. Steirer
Water Purification Demonstration Project Director
City of San Diego, Public Utilities Department

The Demonstration Project has been funded in part by grants from the U.S. Bureau of Reclamation and from a Proposition 50 grant administered by the California Department of Water Resources.

Forward email

City of San Diego | Public Utilities Department | 600 B Street | Suite 600 | San Diego | CA | 92101

AWP Facility Tour Program: Feedback Form

City of San Diego PUBLIC UTILITIES Water & Wastewater

Water Purification | Demonstration Project

Tour Survey

Date: ______________________________

Thank you for attending today's tour. Please take a moment to give us feedback that will help us improve our tour program. Check the box that best applies under each question.

1) How informative was the tour?

☐ Not informative ☐ Informative ☐ Very informative

2) Before the tour, how would you rate your understanding of the water purification process?

☐ Poor ☐ Fair ☐ Good ☐ Excellent

3) After taking the tour, how would you rate your understanding of the water purification process?

☐ Poor ☐ Fair ☐ Good ☐ Excellent

4) How would you rate your tour experience overall?

☐ Poor ☐ Fair ☐ Good ☐ Excellent

DT 6/28/11

5) What was the most valuable information you gained from the tour?

____

____

____

____

6) This tour would have been even better if…

____

____

____

____

7) Additional comments or questions:

____

____

____

8) Your ZIP code:______________________________

9) Organization(s) to which we should offer a tour or presentation:

____

Contact:______________________________________

Thank you. We value your feedback.

AWP Facility Tour Program: Feedback from Tour Guests

A sampling of quotes from the feedback tour guests emailed following their tour experience.

AWP Facility Tour Feedback Excerpts

Thank you and your staff for your forward looking needs of our environment.

It gives me hope that there are young people like yourselves that understand the pressing issues of saving limited resources.

Thank you so much for the free tour of the Water Purification Demonstration Project. My husband and I enjoyed it very much and are looking forward to having some of your lovely water in our tap water…

I want to thank you for an excellent tour this morning. The leaders were very knowledgeable, clear, and friendly. The demonstration project is quite impressive, and I now understand why we San Diegans should welcome well-treated water being added to the San Vicente Reservoir.

Although I personally am very familiar with the project most of our members were not and I think they learned a lot. You did an excellent job of explaining the project.

[J]udging from our informal discussion immediately after the tour- I would say it was very much appreciated. Much valuable information was shared, presented clearly, on a subject of utmost importance to the public's health.

Thank you SO much for having us! The consensus is that the students enjoyed the field trip. I'm a bit surprised considering it was educational. Just goes to show that the people on your end did a great job in relating it to the audience.

I think ALL schools should be made aware of and encouraged to tour your facility.

What a great tour you put on Thursday ... I've been for recycling of the water since the Ron Coss days. Hearing about it is fine, but actually seeing it work is amazing. The tour guides all did such a great job, really shows the pride in work. kudos to the whole gang up there.

Prior to the presentation, I hadn't considered where the upstream, land locked cities dump their treated sewer water. Seeing so many treatment plants along the feeders to Southern California water source made me realize the water treatment proposed for San Diego, is in fact already in place.

AWP Facility Tour Program: Feedback Analysis

TOUR FEEDBACK REPORT

July 2011–
December 2012

Advanced Water Purification Facility

An analysis of responses from Advanced Water Purification Facility tour participants to question and comment prompts on a self-administered post-tour survey card.

BACKGROUND AND PURPOSE

The Advanced Water Purification (AWP) Facility is the centerpiece of the Water Purification Demonstration Project's outreach efforts. Since its opening in June 2011, the AWP Facility has hosted tours for individuals both local and international.

Prior to the end of every tour, participants are encouraged to fill out a survey card in order to determine what aspects of the tour are successful and what aspects need refinement. Based on the results, the outreach team can then adjust the tour experience to reflect the needs of the participants and promote a better understanding of the AWP Facility and the Demonstration Project as a whole.

The survey card includes four quantitative questions (1-4) in which the participants must choose from scaled, pre-selected responses and three open-ended questions (5-7) in which the participants are free to answer in their own words. Additional demographic and outreach suggestion questions (8-9) conclude the survey card. A sample of the card is provided below.

Tour Survey

Date: ______________________________

Thank you for attending today's tour. Please take a moment to give us feedback that will help us improve our tour program. Check the box that best applies under each question.

1) How informative was the tour?

☐ Not informative ☐ Informative ☐ Very informative

2) Before the tour, how would you rate your understanding of the water purification process?

☐ Poor ☐ Fair ☐ Good ☐ Excellent

3) After taking the tour, how would you rate your understanding of the water purification process?

☐ Poor ☐ Fair ☐ Good ☐ Excellent

4) How would you rate your tour experience overall?

☐ Poor ☐ Fair ☐ Good ☐ Excellent

Water Purification | Demonstration Project

5) What was the most valuable information you gained from the tour?

____

____

____

____

6) This tour would have been even better if…

____

____

____

____

7) Additional comments or questions:

____

____

____

8) Your ZIP code:______________________________

9) Organization(s) to which we should offer a tour or presentation:

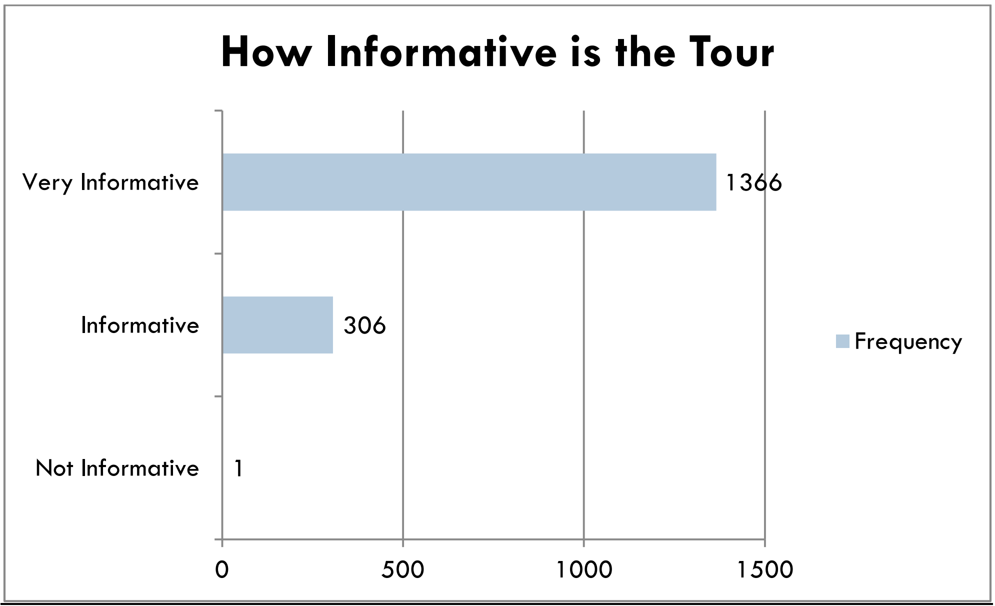
____

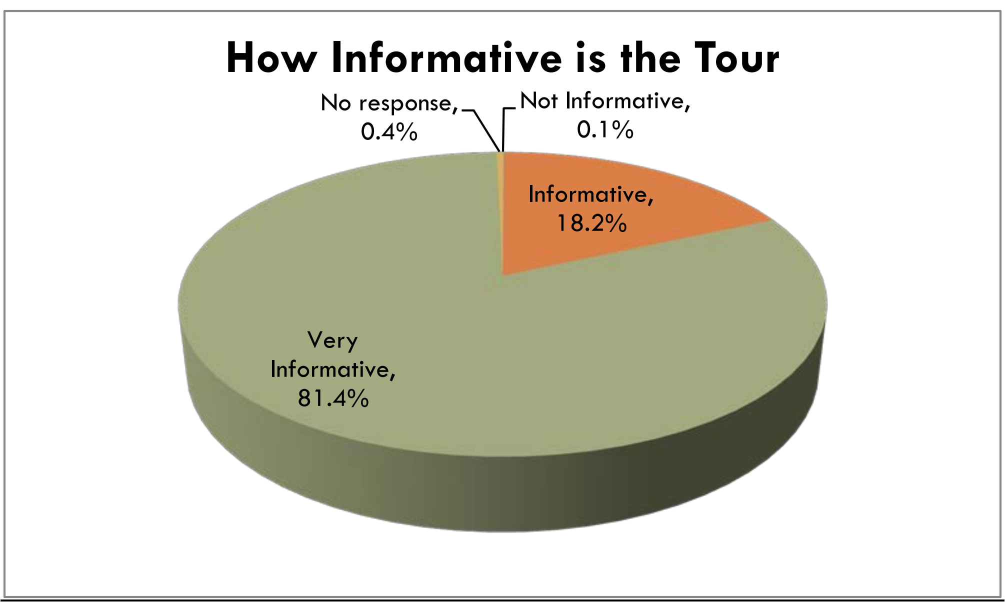
Contact:______________________________

Thank you. We value your feedback.

QUESTION ONE, 'HOW INFORMATIVE WAS THE TOUR?'

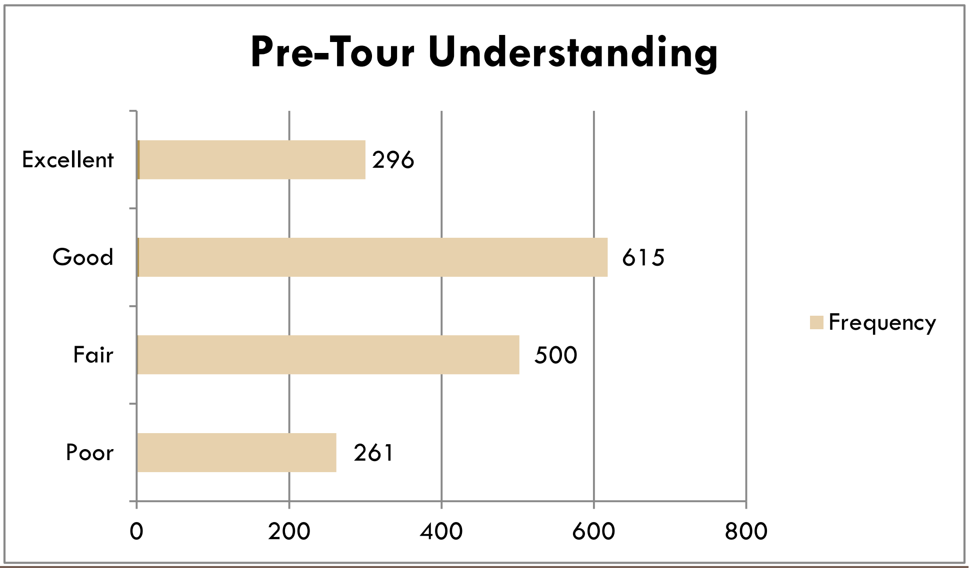
JULY 2011- DECEMBER 2012 CUMULATIVE RESULTS

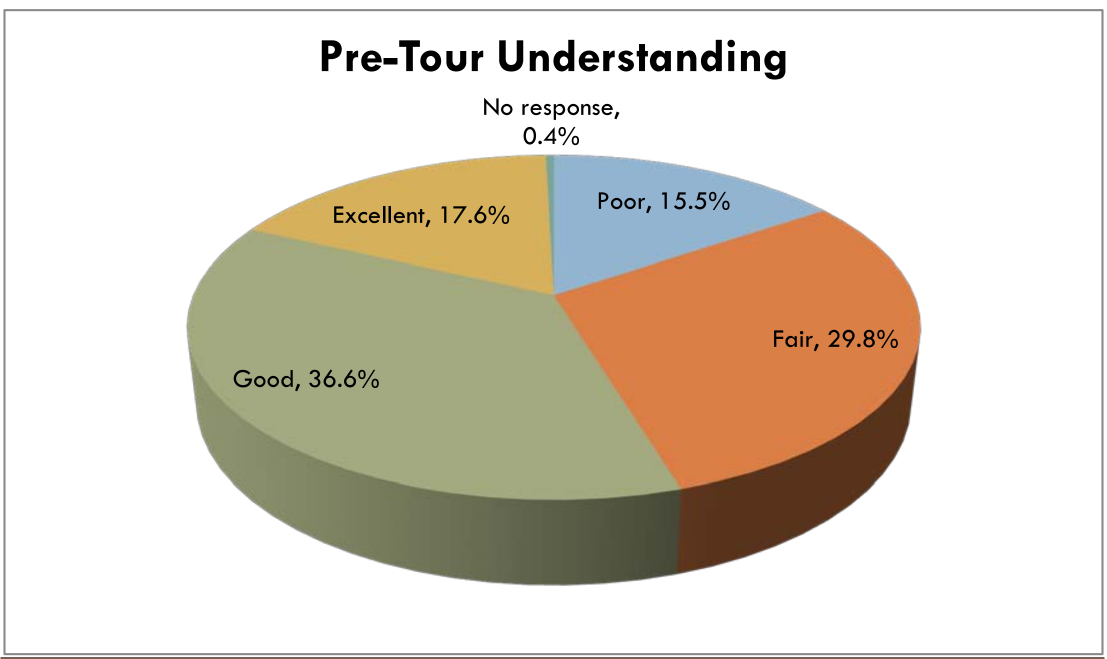




QUESTION TWO, 'BEFORE THE TOUR, HOW WOULD YOU RATE YOUR UNDERSTANDING OF THE WATER PURIFICATION PROCESS?'

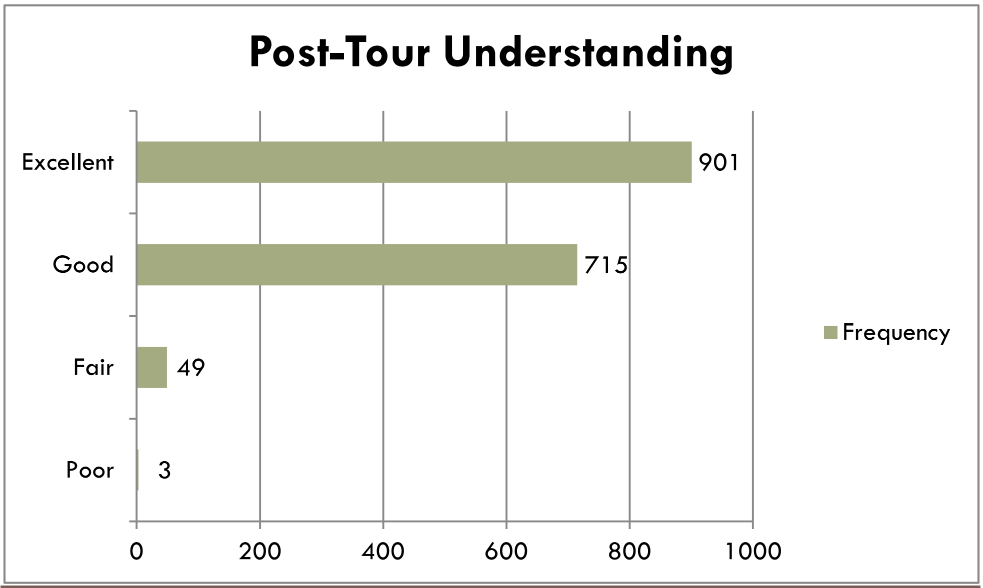
JULY 2011- DECEMBER 2012 CUMULATIVE RESULTS

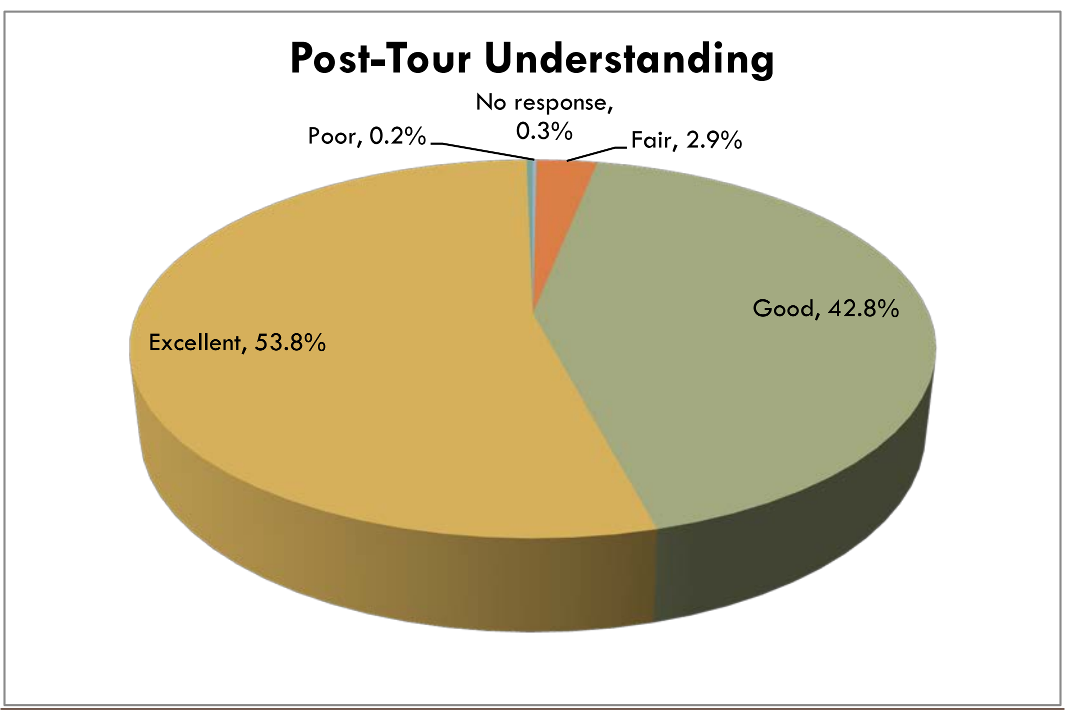




QUESTION THREE, 'AFTER TAKING THE TOUR, HOW WOULD YOU RATE YOUR UNDERSTANDING OF THE WATER PURIFICATION PROCESS?'

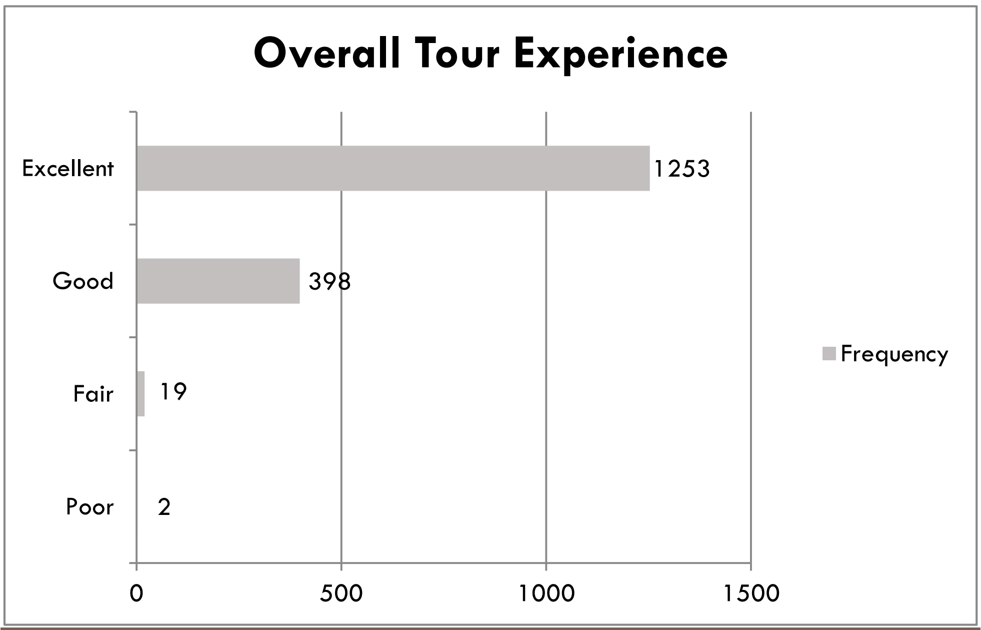
JULY 2011- DECEMBER 2012 CUMULATIVE RESULTS

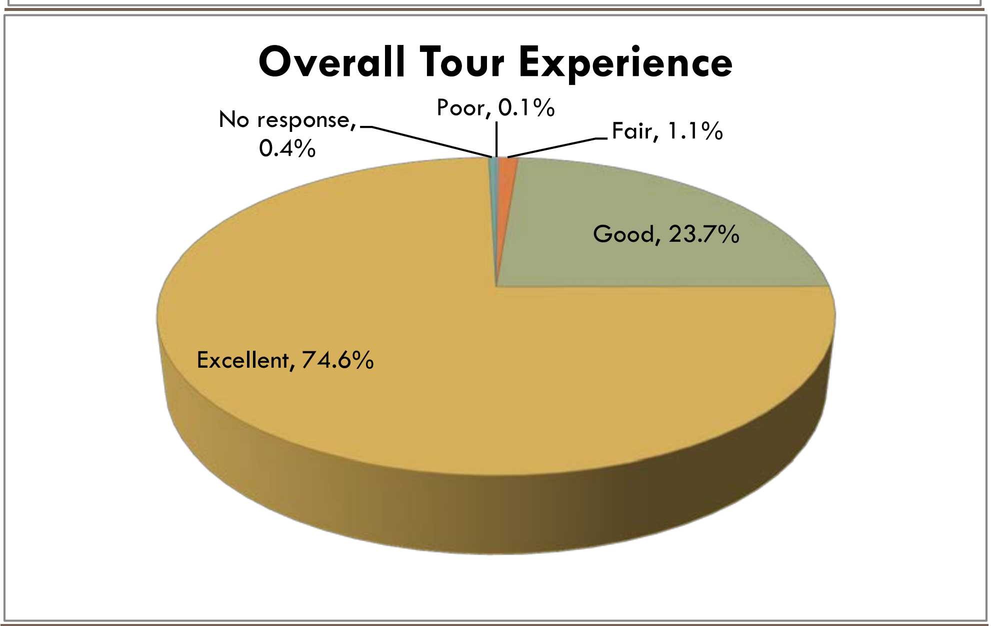




QUESTION FOUR, 'HOW WOULD YOU RATE YOUR TOUR EXPERIENCE OVERALL?'

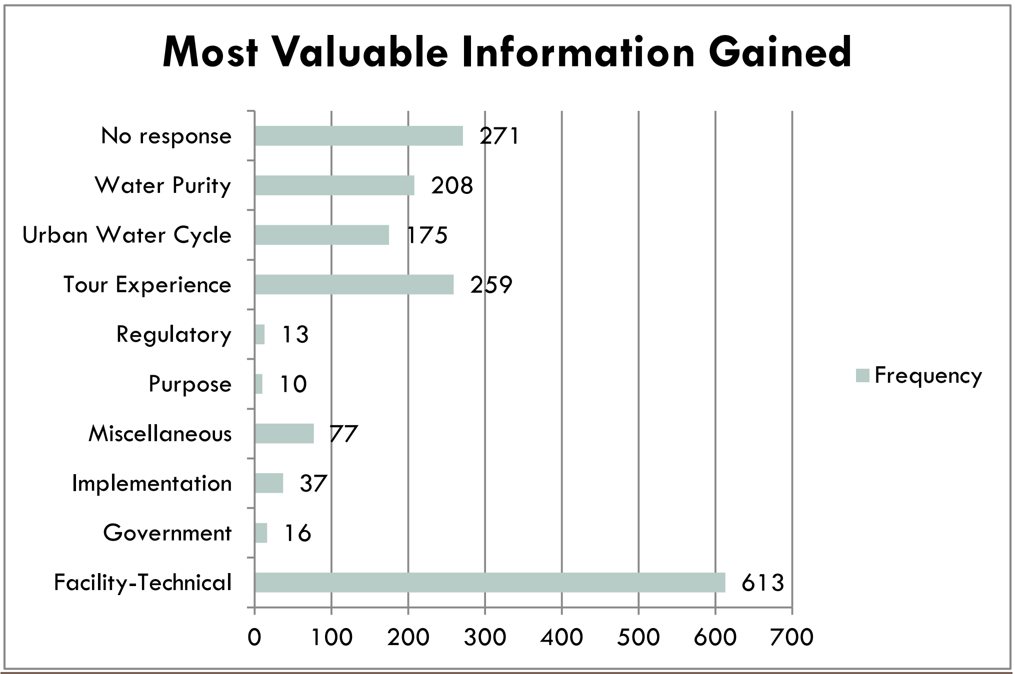
JULY 2011- DECEMBER 2012 CUMULATIVE RESULTS

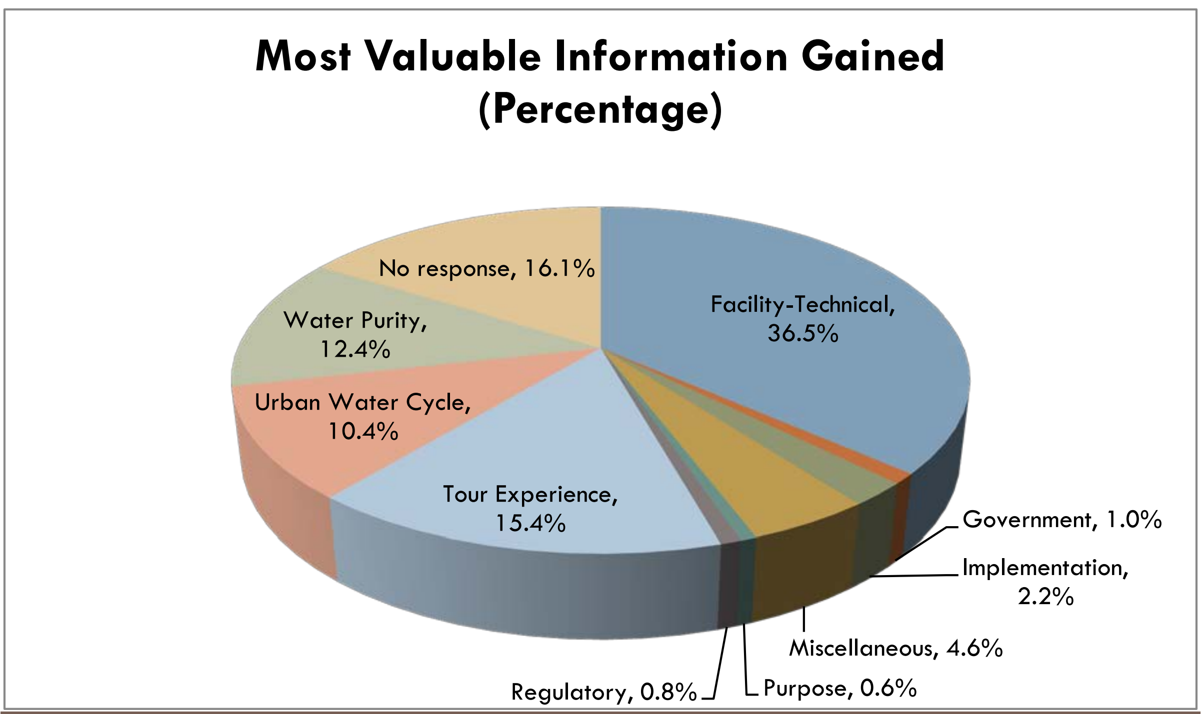




QUESTION FIVE, 'WHAT WAS THE MOST VALUABLE INFORMATION YOU GAINED FROM THE TOUR?'

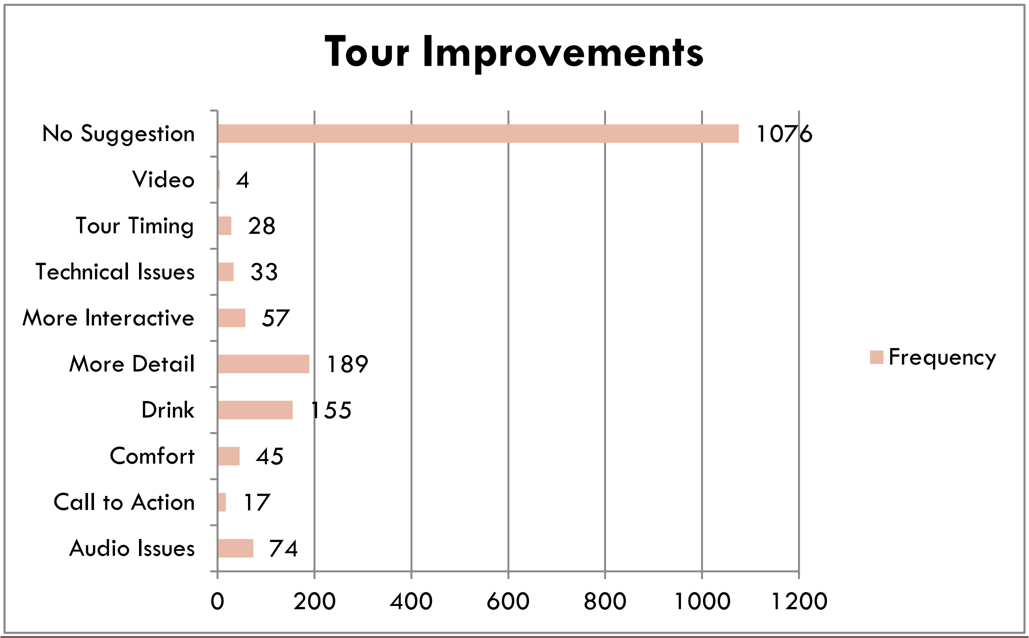
JULY 2011- DECEMBER 2012 CUMULATIVE RESULTS

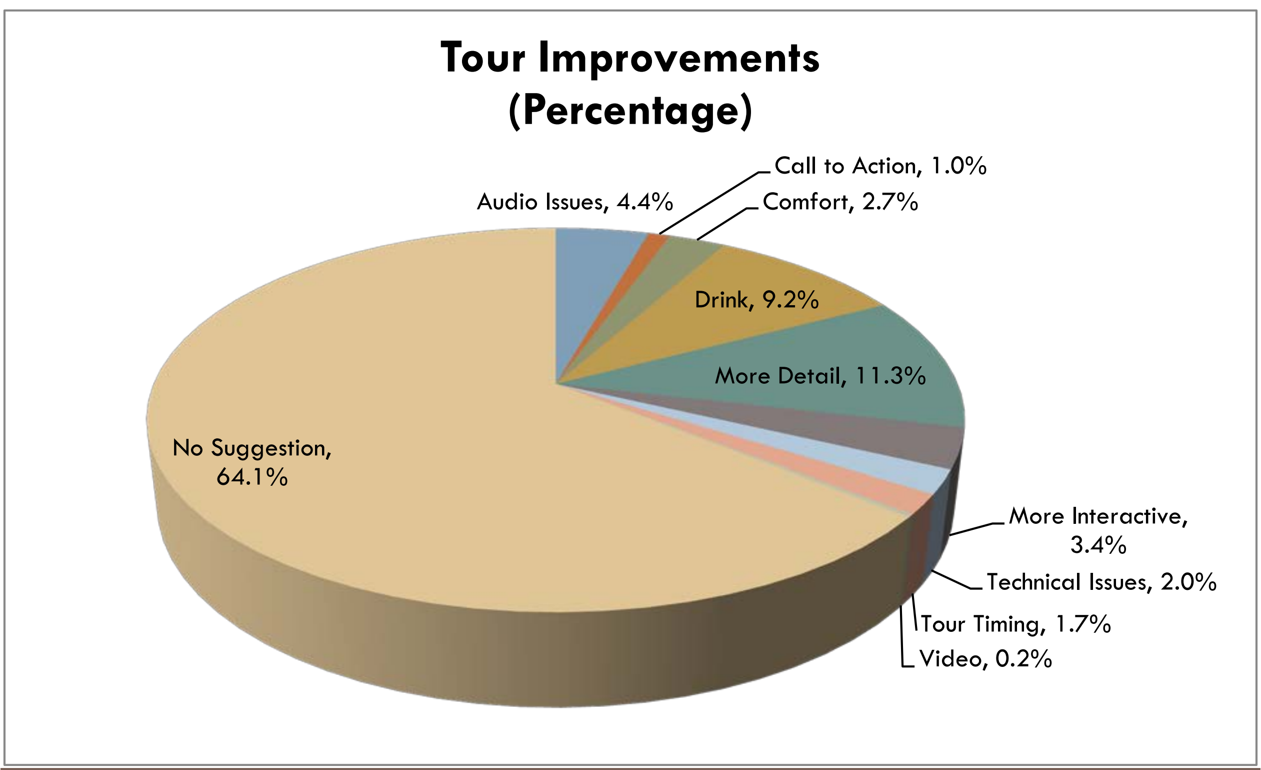




QUESTION SIX, 'THIS TOUR WOULD HAVE BEEN BETTER IF…'

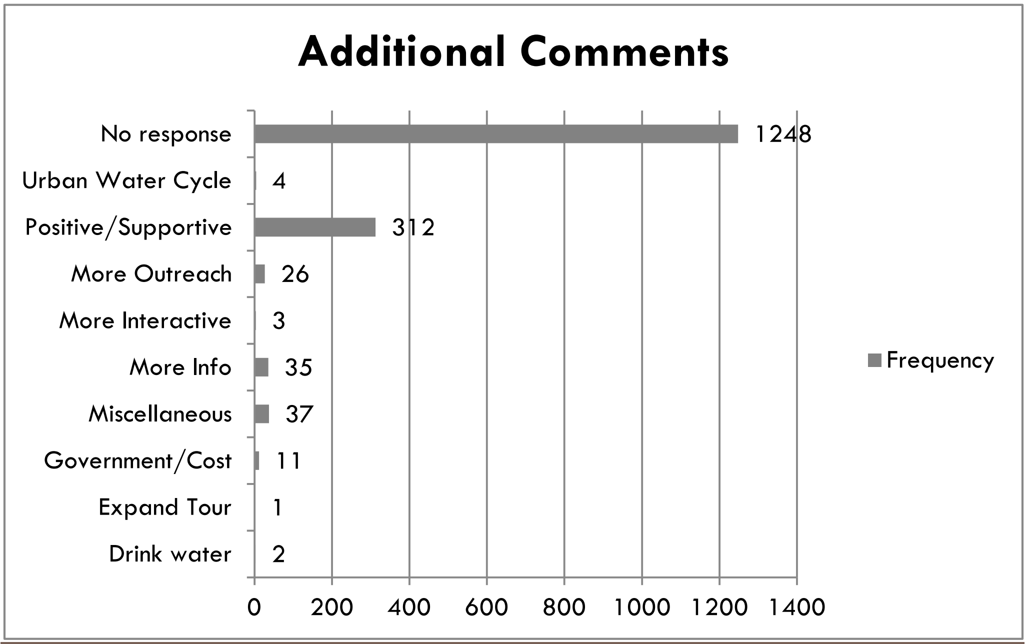
JULY 2011- DECEMBER 2012 CUMULATIVE RESULTS

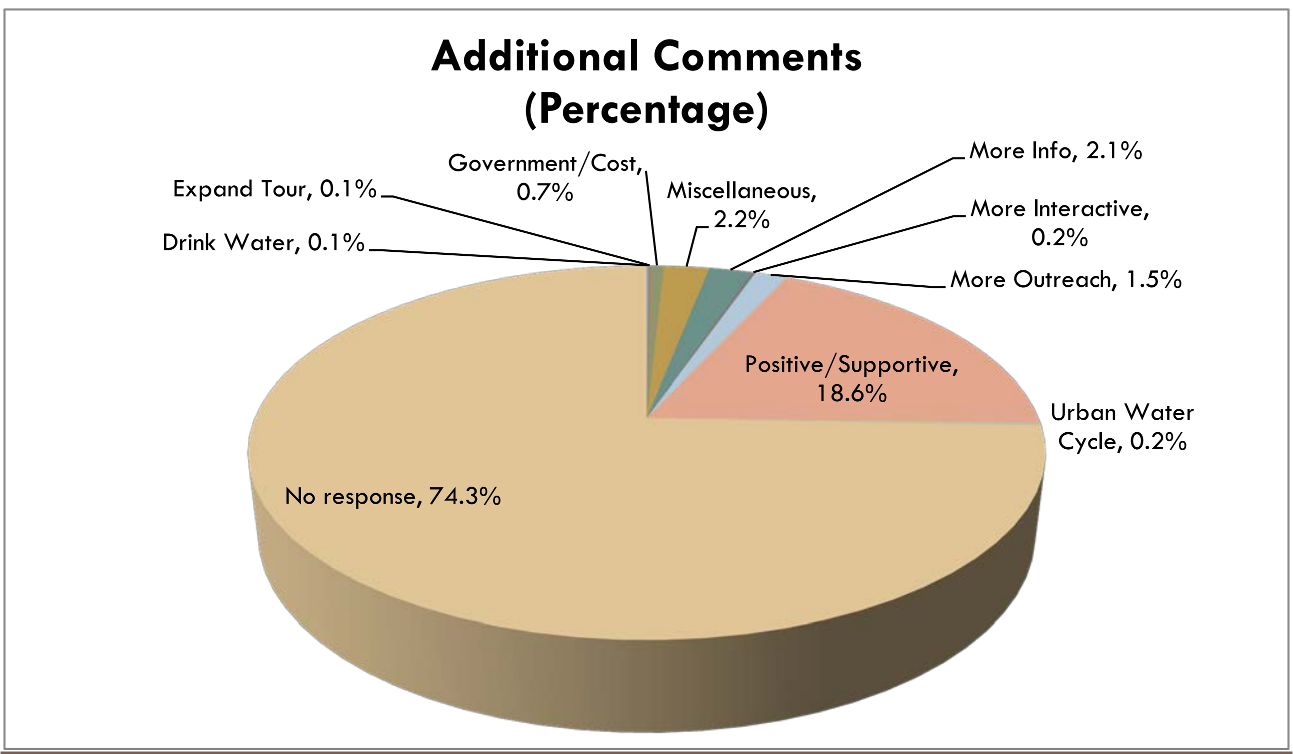




QUESTION SEVEN, 'ADDITIONAL COMMENTS OR QUESTIONS'

JULY 2011- DECEMBER 2012 CUMULATIVE RESULTS





SUMMARYOF RESULTS

QUESTIONS 1-4

The first set of questions (1-4) is quantitative and feature scaled, pre-selected answers from which tour participants could choose from. These questions aimed to measure tour participants' feelings on the informational content of the tour as well as their overall tour experience. Questions two and three measured participants' pre-tour and post-tour understanding of the water purification process to gauge if the tour experience served to heighten their understanding.

Between July 2011 and December 2012, a vast majority of those who participated in the tour of the AWP Facility rated the tour as "very informative." Only one response out of 1,679 responses characterized the tour as "not informative."

In evaluating their existing knowledge, 54 percent of participants characterized their pre-tour understanding of water purification as either "good" (36.6 percent) or "excellent" (17.6 perecent) while nearly 97 percent of respondents characterized their post-tour understanding as "good" (42.8 percent) or "excellent" (53.8 percent). The numbers show a positive correlation between the tour experience and a rise in understanding of the water purification process.

The vast majority of participants (nearly 75 percent) rated their tour experience as "excellent."

QUESTIONS 5-7

The second set of questions (5-7) is qualitative or open-ended and participants answered them in their own words. Their responses were then assigned categories based on content (see Tour Feedback Report Appendices A, B, and C) in order to analyze any trends in their responses.

The majority of participants stated that the most valuable information they gained from the tour was knowledge of the water purification process and being able to see, up close, the water purification equipment functioning.

When asked how they would improve their tour experience, the majority of participants gave either no suggestion or general positive feedback.

When asked for additional comment, the majority of participants offered either no response or general positive feedback.

Overall feedback, both quantitative and qualitative, was positive and encouraging from the beginning of the tour program. In analyzing the monthly trends, the numbers showed no major issues to reconcile and no cause for major tour improvements. Participants generally found the tour to be educational, interesting and a positive experience.

APPENDIX A - EXPLANATORY KEY FOR OPEN-ENDED QUESTION #5

'WHAT WAS THE MOST VALUABLE INFORMATION YOU GAINED FROM THE TOUR'

Response Category	Definition
Water Purity	Any mention of the purity, safety or clarity of the product water
Tour Experience	Includes mentions of "downstream," videos, guide knowledge and any mention towards the overall tour as an educational experience
Facility-Technical	Any mention of the actual equipment and/or knowledge gained by seeing and interacting. Also refers to the mention of the process of water purification
Government	Any mention of government (particularly the City) involvement with the project
Urban Water Cycle	Any mention of the water cycle (natural or urban), where our water comes from, where it goes, recycled water, reclamation, etc.
Implementation	Any mention of implementation or timeline for the project, long-term planning, cost-savings of implementation
Regulatory	Any mentions of regulations or policies
Purpose	Learning of the purpose for the Demonstration Project or of a full-scale project
Miscellaneous	Does not fall in a category or is not a relevant response

APPENDIX B – EXPLANATORY KEY FOR OPEN-ENDED QUESTION #6

'THIS TOUR WOULD HAVE BEEN BETTER IF…'

Response Category	Definition
Audio Issues	Any mention of problems hearing the tour guides due to PA speaker volume or jets flying overhead
Comfort	Any preference for bigger or smaller tour groups. Any mention of preference for refreshments.
Drink	Requests to drink IPR finished water and/or compare it with other waters (bottled, distilled, etc.)
Technical Issues	Mentions of concerns or incidents of operational or tour procedure issues.
Video	Any mention of the videos viewed during the presentation phase of the tour
Tour Timing	Any mention of the speed of the tour or length of the tour
More Detail	Requesting more information on contaminants, Orange County IPR, project costs, job creation, urban water cycle and environmental impact
More Interactive	Any mention of eliminating portions of the tour, use of language that is too technical or requesting a more hands-on experience
Call to Action	Any mentions of political involvement, social issues or informing the public to "take action"
No Suggestion	No response, unrealistic suggestions and/or positive feedback.

APPENDIX C - EXPLANATORY KEY FOR OPEN-ENDED QUESTION #7

‘ADDITIONAL COMMENTS OR QUESTIONS:’

Response Category	Definition
Positive Supportive	Complimentary messages or messages that express satisfaction with the tour and encouragement for the project
Urban Water Cycle	Any mention of the water cycle, natural or urban, where our water comes from, where it goes, RW, reclamation, etc.
Gov’t/Cost	Any mention of government, regulation or any other governing body or organization involved with the project, or any desire for more information about cost
More Outreach	Comments that request the tour be given to more people or more widely promoted
More Info	Mention of wide variety of more information requested
Expand Tour	Any mention of the tour being longer or actually touring the whole reclamation plant
Drink Water	Mention that they wanted to taste the finished product water
Miscellaneous	Any other response that did not fit in another response category
More Interactive	Mentions of ways to improve the tour to be more engaging or “hands-on”
No Response	“No comment” or left blank

Appendix H: Public Outreach and Education

Section 4: Social Media, Conferences and Awards

Social Media Editorial Calendar

A sample of the December 2012 editorial calendar used to determine Facebook and Twitter postings. Editorial calendars were produced monthly beginning in October 2011.

Water Purification Demonstration Project
Social Media Message Calendar: December 2012

Dec.	Facebook & Twitter
1	x
2	x
3	There is no water to waste, just wasted water. Make a conscious effort to conserve water in your home or business. Some simple tips to save water: http://www.sandiego.gov/water/pdf/conservation/waystosavewater.pdf
4	The Demonstration Project welcomes representatives from the California Department of Public Health to the AWP Facility. We have given over 130 presentations to groups around San Diego. If you would like to schedule a speaker to educate your group on the future of San Diego water, email purewatersd@sandiego.gov or call the hotline at (619) 533-6638.
5	"In time and with water, everything changes" Leonardo da Vinci
6	Brackish water? Advanced oxidation? Decode these and other water purification terms here: http://www.sandiego.gov/water/waterreuse/pdf/100908wpdglossary.pdf
7	While the daily recommended amount of water is eight cups per day, not all of this water must be consumed in the liquid form. Nearly every food or drink item provides some water to the body.
8	x
9	x
10	"Water is the basis of life and the blue arteries of the earth! Everything in the non-marine environment depends on freshwater to survive." –Sandra Postel
11	Water treatment has been around since ancient civilizations. Brush up on a brief history of drinking water treatment at http://www.epa.gov/ogwdw/consumer/pdf/hist.pdf
12	The Demonstration Project welcomes students from Madison High School to the AWP Facility.
13	Interested in getting involved with the WPDP? Check out the Public Involvement page of our website to learn how: http://bit.ly/RoG3le
14	In the world of water, we are all downstream: past, present and future.
15	x
16	x
17	[Provide update about the final report.]
18	"Water is the lifeblood of our bodies, our economy, our nation and our well-being"-Stephen Johnson, former EPA administrator
19	Find answers to frequently asked questions about the quality of your water. http://www.sandiego.gov/water/quality/faqs.shtml
20	"In an age when man has forgotten his origins and is blind even to his most essential needs for survival, water along with other resources has become the victim of his indifference." – Rachel Carson
21	Wishing you and yours a very happy holiday season and a happy new year! See you in 2013.
22-31	x

Facebook

The screenshot of the Demonstration Project’s Facebook page was taken in January 2013.

WATER PURIFICATION DEMONSTRATION PROJECT
FACEBOOK PAGE (WWW.FACEBOOK.COM/SANDIEGOWPDP)

Twitter

The screenshot of the Demonstration Project's Twitter page was taken in January 2013.

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

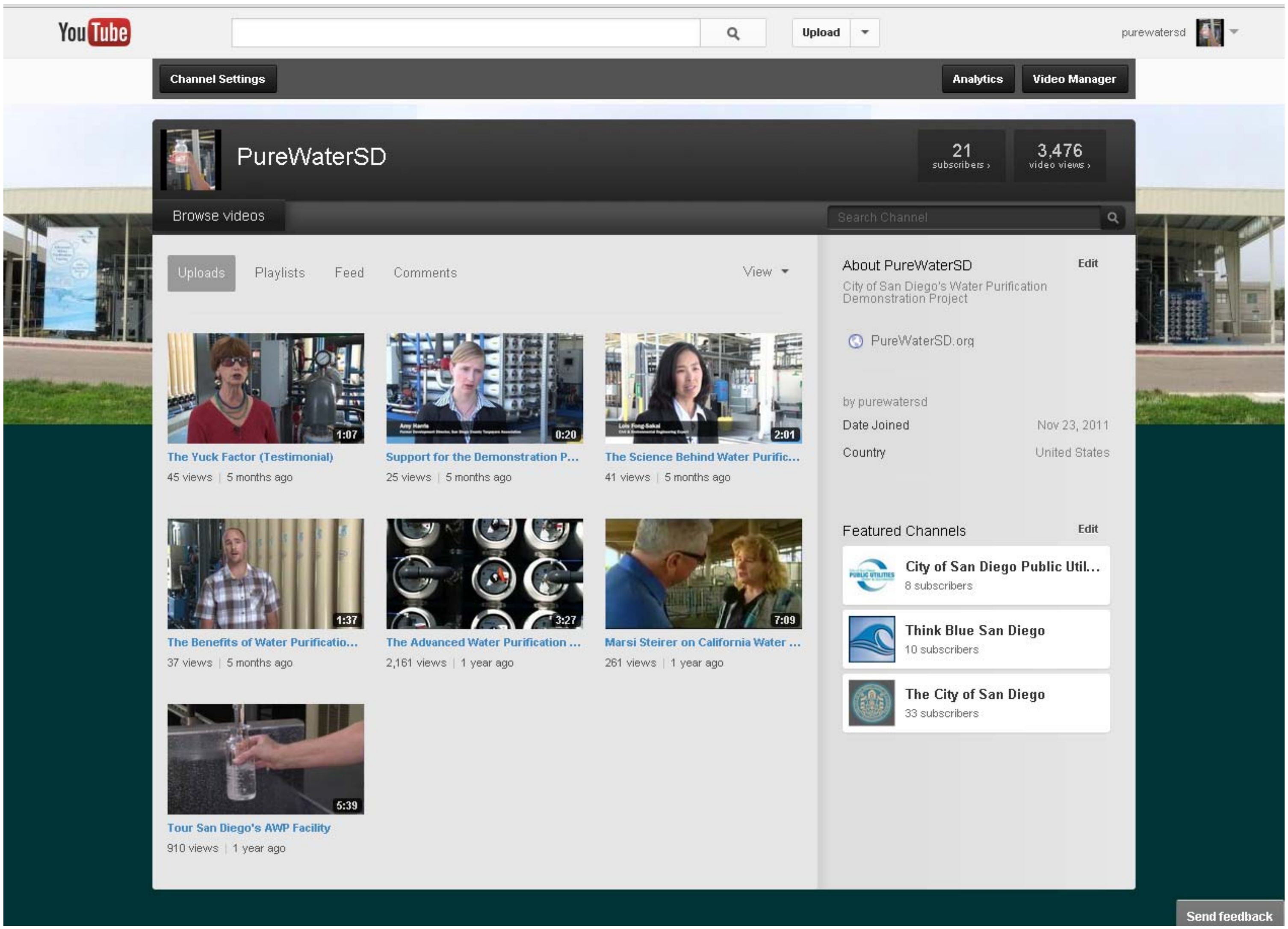
WATER PURIFICATION DEMONSTRATION PROJECT
TWITTER PAGE (WWW.TWITTER.COM/PUREWATERSD)

YouTube

The screenshot of the Demonstration Project’s YouTube page was taken in January 2013. A snapshot of the project’s YouTube video analytics is also included.

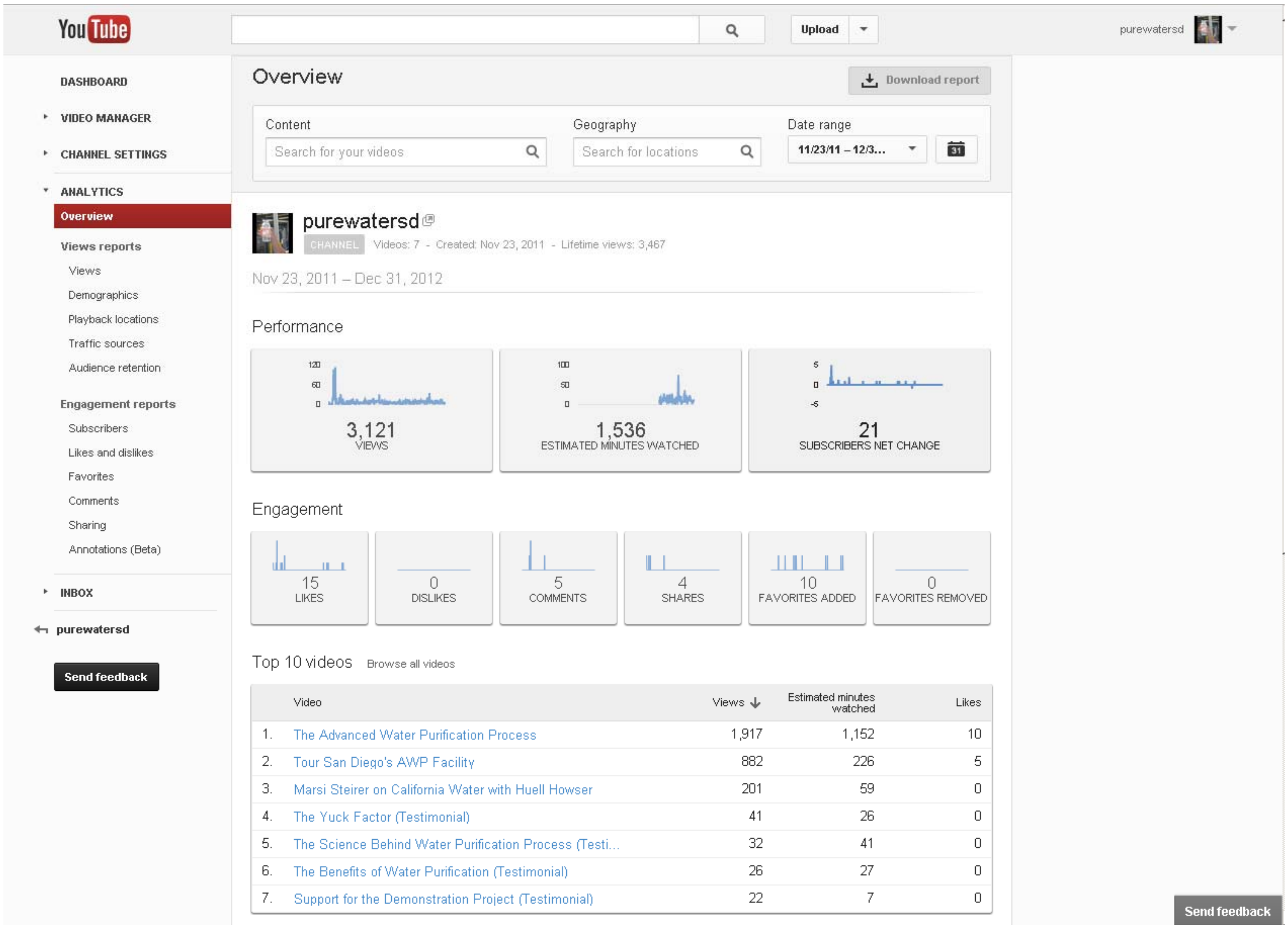
City of San Diego
PUBLIC UTILITIES
Water & Wastewater

WATER PURIFICATION DEMONSTRATION PROJECT
YOUTUBE PAGE (WWW.YOUTUBE.COM/PUREWATERSD) AND ANALYTICS



WATER PURIFICATION DEMONSTRATION PROJECT

YOUTUBE PAGE (WWW.YOUTUBE.COM/PUREWATERSD) AND ANALYTICS



Conferences: Conference List

A list of conferences at which the Demonstration Project team presented project information

Water Purification Demonstration Project
Conference Involvement (March 2010 - December 2012)

Conference	Location	Date	Abstract Title	Topic	Presenter
2010 WateReuse California Annual Conference	San Diego, CA	March 7-9, 2010	City of San Diego's Indirect Potable Reuse/Reservoir Augmentation Demonstration Project	General	Marsi
AWWA ACE 10	Chicago, IL	June 20-24, 2010	Managing Water Resources in a Sustainable Manner	General	Marsi
25th Annual WateReuse Symposium	Washington, D.C.	Sep. 12-15, 2010	Developing a Model Solution for Sustainability through Water Reuse	Technical	Marsi
2011 Utilities Management Conference	Denver, CO	Feb. 8-11, 2011	City of San Diego Water Purification Demonstration Project	Technical	Marsi
2011 WateReuse California Annual Conference	Dana Point, CA	March 20-22, 2011	Evaluating the Feasibility of a New Local Water Supply for San Diego	Technical	Anthony
AWWA ACE 11	Washington, D.C.	June 11-12, 2011	Changing Public Perception with Education and Information	Outreach	Marsi
AWWA ACE 11	Washington, D.C.	June 11-12, 2011	Is Advanced Purified Water Feasible?	Technical	Marsi
26th Annual WateReuse Symposium	Phoenix, AZ	Sept. 11-14, 2011	Development of a Comprehensive T&M Plan	Technical	Jay
26th Annual WateReuse Symposium	Phoenix, AZ	Sept. 11-14, 2011	Changing Public Perception with Education and Information	Outreach	Marsi
ACWA's 2011 Continuing Legal Education for Water	San Diego, CA	Sept. 22-23, 2011	City of San Diego Water Purification Demonstration Project	Outreach	Marsi
WEFTEC 11	Los Angeles, CA	October 15-19, 2011	City of San Diego Water Purification Demonstration Project	Technical	Joseph
2011 Potable Reuse Conference	Hollywood, FL	Nov. 13-15, 2011	City of San Diego Water Purification Demonstration Project	Outreach	Marsi
2011 Potable Reuse Conference	Hollywood, FL	Nov. 13-15, 2011	"Seeing is Believing" for the Water Purification Process	Outreach	Patsy
2011 Potable Reuse Conference	Hollywood, FL	Nov. 13-15, 2011	Performance & Reliability Monitoring of Advanced Water Treatment Unit Processes for Indirect Potable Reuse—A Stepping Stone for Potable Reuse	Technical	Jay
ASCE Region 9 Annual California Infrastructure Symposium	Sacramento, CA	February 28, 2012	City of San Diego Water Purification Demonstration Project	General	Marsi
2012 WateReuse California Annual Conference	Sacramento, CA	March 25-27, 2012	City of San Diego Advanced Water Purification Facility Tour Experience	Outreach	Marsi
2012 WateReuse California Annual Conference	Sacramento, CA	March 25-27, 2012	City of San Diego Update of the Water Purification Demonstration Project	Technical	Anthony
Ozwater'12 (Australian Water Association)	Sydney, Australia	May 8-10, 2012	Overcoming Barriers to the Acceptance of Potable Reuse as an Alternative Water Source	Outreach	Marsi
16th Annual Water Reuse & Desalination Research Conference	San Diego, CA	June 4-5, 2012	Development of a Three Dimensional Hydrodynamic Model to Assess Indirect Potable Reuse/Reservoir Augmentation in San Vicente Reservoir	Technical	Jeff
16th Annual Water Reuse & Desalination Research Conference	San Diego, CA	June 4-5, 2012	Practice What You Find: Tailoring Outreach Efforts Based on Research Findings	Outreach	Marsi
16th Annual Water Reuse & Desalination Research Conference	San Diego, CA	June 4-5, 2012	Evaluation of Performance Monitoring Methods for AWP Processes: City of SD AWP Demonstration Project	Technical	Bill/Jay
AWWA ACE 12	Dallas, TX	June 10-14, 2012	City of San Diego Advanced Water Purification Facility Tour Experience	Outreach	Marsi
AWWA ACE 12	Dallas, TX	June 10-14, 2012	City of San Diego Update of the Water Purification Demonstration Project	Technical	Marsi
AWWA ACE 12	Dallas, TX	June 10-14, 2012	Comparing Multiple MF/UF and RO Systems for Indirect Potable Reuse in Side-by-Side Comparison	Technical	Greg W.
Western Coalition of Arid States (WESTCAS) 2012 Annual Conference	San Diego, CA	June 18-20, 2012	San Diego Water Purification Demonstration Project	General	Marsi
WateReuse Foundation Webcast - Panel Discussion	Marsi's office	June 26, 2012 at 2PM	WateReuse Association Webcast - Accelerating the Progress of Potable Reuse	Outreach	Marsi
CA-NV AWWA Desalination Committee Workshop	Foster City, CA	August 21, 2012	San Diego Water Purification Demonstration Project	Outreach	Alma
CA-NV AWWA Desalination Committee Workshop	Fountain Valley, CA	August 23, 2012	San Diego Water Purification Demonstration Project	Outreach	Alma
27th Annual Water Reuse Symposium	Hollywood, FL	September 9-12, 2012	"Seeing is Believing" for the Water Purification Process	Outreach	Marsi
27th Annual Water Reuse Symposium	Hollywood, FL	September 9-12, 2012	Evaluation of Performance & Reliability of Advanced Water Purification Processes: City of San Diego Advanced Water Purification Demonstration Project	Technical	Jay D.
California Lake Management Society	San Diego, CA	Oct 4 - 5, 2012	San Diego's Water Purification Demonstration Project: Changing Public Perception of IPR/RA	Technical	Marsi
CA-NV AWWA 2012 Annual Fall Conference	San Diego, CA	Oct. 8 - Oct 11, 2012	The City of SD's Water Purification Demonstration Project	Outreach	Marsi
CA-NV AWWA 2012 Annual Fall Conference	San Diego, CA	Oct. 8 - Oct 11, 2012	A Comparison of Operating Conditions and Performance of Indirect Potable Reuse Facilities for San Diego's Demonstration Plant	Technical	Greg W./Jen T.

Conferences: Conference Poster

Poster displayed at various conferences

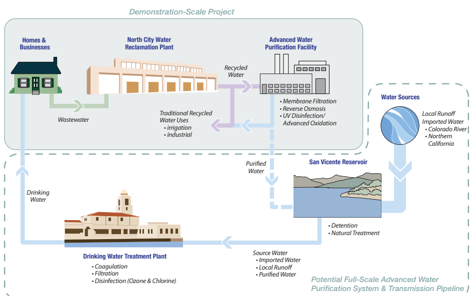
THE CITY OF SAN DIEGO

Water Purification | Demonstration Project

City of San Diego PUBLIC UTILITIES Water & Wastewater

The City of San Diego is evaluating the feasibility of using advanced water treatment technology on recycled water for augmentation of supplies in a local reservoir. The newly purified water would undergo additional treatment before it is added to the drinking water supply. The intent of the Water Purification Demonstration Project is to establish the technical, water quality, environmental, public outreach, regulatory, and funding requirements necessary to implement a full-scale project.

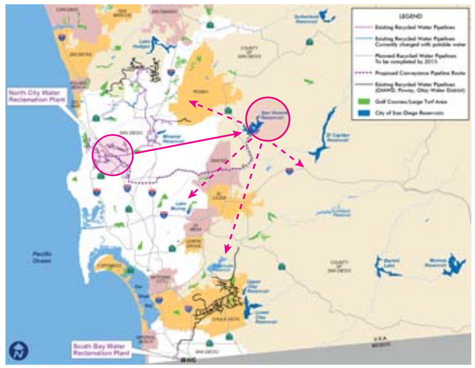
City of San Diego's
Water Purification Demonstration Project
Purification Process



Water Purification Demonstration Project Tasks

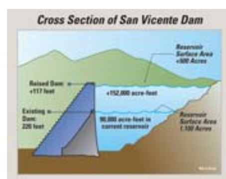
- Operate and test a 1 MGD demonstration-scale Advanced Water Purification Facility.
- Conduct a limnology and reservoir detention study of the San Vicente Reservoir.
- Conduct an energy and economic analysis.
- Conduct a public outreach and education program.
- Define regulatory requirements for a potential full-scale project.

Demonstration Project Concept



San Vicente Reservoir Limnology and Detention Study

- Construction timeline: 2009 – 2013
- 3D model of San Vicente was developed to evaluate the hydrodynamic & water quality effects of using purified water to augment the reservoir.
- Augmentation would improve water quality.

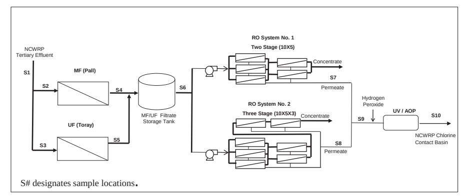


Public Outreach & Education

- Speakers Bureau
- Website/Social Media
- AWP Facility Tours

Advanced Water Purification (AWP) Facility

- Operating in accordance with a Testing & Monitoring Plan.
- Equipment selected is scalable for future full-scale facility.
- Purified water used to supplement recycled water system.



AWP Facility Process Schematic

Membrane Filtration

- Microfiltration & ultrafiltration situated side-by-side to test effectiveness prior to reverse osmosis.
- Pressurized hollow fiber membranes.
- MF nominal pore size of 0.10 microns.
- UF nominal pore size of 0.02 microns.

Reverse Osmosis (RO)

- RO set to test two configurations, 0.5 MGD side-by-side to quantify trade-offs:
  - Greater rejection and lower feed pressure
  - Comparison of 2-stage vs. 3-stage configurations
- RO Train 1 has lower pressure membranes (2-stage).
- RO Train 2 has higher pressure and higher rejection membranes (3-stage).
- Energy recovery devices.

Ultraviolet Light/Advanced Oxidation Process (UV/AOP)

- RO permeate feeds UV/AOP.
- Hydrogen peroxide 30% is injected upstream of UV at 3 mg/L.
- UV system utilizes low pressure/high output lamps.
- Single reactor, 72 lamp configuration.

Water Quality

- Purified water tested for more than 300 compounds.
- Compounds tested have regulatory limits for meeting drinking water standards.
- Tested for compounds under consideration for regulation, including chemicals of emerging concern.

Quarterly Results

- Exceptional overall water quality
- Purified water met drinking water standards

Visit: www.purewatersd.org

www.facebook.com/SanDiegoWPDP

@PureWaterSD

YouTube PureWaterSD

Awards

Photographs of the WateReuse Association awards won by the Demonstration Project in 2011 and 2012

WateReuse Awards

Appendix H: Public Outreach and Education

Section 5: Media Outreach

Template Article

The template article regarding the AWP Facility opening was prepared and distributed to local publications in July 2011. Updated variations were produced and distributed to additional publications as needed.

Future of water on public display at San Diego's Water Purification Demonstration Project

by Marsi A. Steirer, Water Purification Demonstration Project Director,
City of San Diego, Public Utilities Department

The City of San Diego opens the doors this summer to a facility that is testing whether it could provide a new local source of water for San Diego. Located in northern San Diego, the Advanced Water Purification Facility is a small-scale, state-of-the-art water purification facility that purifies one million gallons of recycled water every day to a level similar to distilled water quality.

The facility is one component of the City's Water Purification Demonstration Project that is examining the safety and cost of purifying recycled water. If this project is approved to go full-scale, the purified water would blend with the City's imported supplies at San Vicente Reservoir and would become part of the City's drinking water supply. As another component of the Demonstration Project, the City is studying San Vicente Reservoir and the potential effects of adding purified water to it. During the year-long test phase, purified water will not be sent to San Vicente Reservoir or the City's drinking water system; instead, the purified water will be added to the City's recycled water system.

San Diego is testing water purification as a means to develop a locally controlled, supplemental water supply. San Diego's semi-arid region is at the end of pipelines that import water from hundreds of miles away. The City needs to develop local, reliable water sources to lessen its dependence on expensive and limited imported water supplies.

"Our City has been both creative and aggressive in trying to diversify our water supply. The less we rely on importing water from outside San Diego County, the more we control our own destiny," San Diego Mayor Jerry Sanders said. "A locally produced supply of water could be an important option for us."

All wastewater in San Diego undergoes treatment to remove harmful contaminants, making it safe enough to be discharged into the ocean. Some wastewater is diverted to the City's recycled water facilities, where it is further treated and then used for irrigation and industrial purposes. A portion of the recycled water produced at the North City Water Reclamation Plant will be sent to the Advanced Water Purification Facility.

At the facility, the recycled water undergoes the multi-barrier purification process, which includes membrane filtration, reverse osmosis, and advanced oxidation with ultraviolet disinfection and high-strength hydrogen peroxide. The multi-barrier approach of consecutive treatment steps work together to remove or destroy all unwanted materials in the water and produces one of the most pristine supplies of water available anywhere. Each step in the process also includes continuous water quality monitoring. The City thoroughly examines the safety of the water through laboratory tests and computer analysis to ensure that it meets public health standards.

The data from the Demonstration Project will be thoroughly examined, and the results will determine the safety and cost of a full-scale water purification and reservoir augmentation project. After the test phase is complete, the City Council and Mayor will decide whether to implement a full-scale project.

“This Demonstration Project will provide the answers San Diego needs before taking the next step with purified water,” said Mayor Sanders. ”We owe it to our citizens to see if we can come up with an alternative source of local, safe and relatively inexpensive drinking water.”

The same water purification process is already used around the world. Just north of San Diego, Orange County operates the world’s largest water purification plant. The Orange County Groundwater Replenishment System produces up to 70 million gallons a day of ultra clean water to provide safe and reliable drinking water for nearly 600,000 residents. The purified water is produced from secondary-treated wastewater and injected into the county’s drinking water aquifer.

Visitors are welcome and encouraged to tour the Advanced Water Purification Facility through summer 2012. Guests who participate in the AWP Facility tour will gain a better understanding of the Demonstration Project and what role the facility plays in this testing phase. Following an introductory presentation, tour participants will take a walking tour through the facility to view the water purification technology equipment up close. At the end of the tour, guests will view the purified water produced at the facility. To register for a tour, visit www.purewatersd.org/tours.shtml. For more information about the City of San Diego’s Water Purification Demonstration Project, visit www.purewatersd.org, email purewatersd@sandiego.gov, or call (619)533-7572.

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Press Release: Drinking Water Week

This press release was distributed to community publications in May 2012 to publicize the AWP Facility open house tours in honor of national Drinking Water Week 2012.

THE CITY OF SAN DIEGO
PUBLIC UTILITIES

FOR IMMEDIATE RELEASE
May 4, 2012

MEDIA CONTACTS:
Alma Rife
(619) 533-5477

City's Water Purification Demonstration Project Celebrates Drinking Water Week with Open House Tours

City Studying Feasibility of Purifying Wastewater for Drinking Water

SAN DIEGO – The City of San Diego's Water Purification Demonstration Project will commemorate Drinking Water Week 2012 by offering free open house tours of its Advanced Water Purification Facility in northern San Diego on Saturday, May 12. Back-to-back tours will be offered from 10:30 a.m. to 12:30 p.m. Registration for the open house tours closes on Wednesday, May 9. Register for a tour at **www.purewatersd.org/tours.shtml**.

"Drinking Water Week is a unique opportunity for water professionals and the communities they serve to join together to recognize the vital role water plays in our daily lives," said San Diego Public Utilities Director Roger Bailey. "With limited local drinking water supplies and a reliance on importing approximately 85 percent of its water, San Diego is extremely aware of the need for secure, local drinking water. The Water Purification Demonstration Project plays an important role in exploring advanced technology to augment San Diego's water portfolio."

The Demonstration Project is examining the cost and safety of purifying recycled water as a means to develop a locally controlled, supplemental drinking water supply. The Advanced Water Purification Facility is a small-scale facility that purifies one million gallons of recycled water every day. Currently, the purified water produced at the facility is returned to the recycled water distribution system for irrigation and industrial purposes. If all regulatory requirements are met, funding is identified and approval is granted by Mayor and Council, a full-scale water purification facility could provide San Diego with a new source of local drinking water.

During the facility tours, guests will learn what the Demonstration Project is about and what role the Advanced Water Purification Facility plays in this testing phase. Following an introductory presentation, participants take a walking tour through the facility to view the water purification technology equipment up close and hear more about how the purification process works. At the end of the tour, guests are challenged to decipher samples of purified, recycled and tap water. Since opening in June 2011, more than 2,000 people have toured the facility.

For more information about the Water Purification Demonstration Project, visit **www.purewatersd.org** or email **purewatersd@sandiego.gov**.

# # #

Press Release: WateReuse Association Award

This press release was distributed to local publications in September 2012 to publicize the Demonstration Project winning the WateReuse Association's Small Project of the Year Award. A similar release was distributed the previous year when the Demonstration Project won the WateReuse Association's Public Education Program of the Year Award.

THE CITY OF SAN DIEGO
PUBLIC UTILITIES

FOR IMMEDIATE RELEASE
September 18, 2012

MEDIA CONTACT:
Alma Rife
(619) 533-5477

City's Water Purification Demonstration Project Honored with National Award

Project Receives 2012 Small Project of the Year

SAN DIEGO – Last week, the WateReuse Association honored the City of San Diego's Water Purification Demonstration Project with the "2012 WateReuse Small Project of the Year Award" at its 27th Annual Symposium in Florida. Since the Demonstration Project began in 2009, the City's Public Utilities Department has been examining the use of water purification technology to potentially provide safe and reliable water for San Diego's future. This comprehensive pilot program includes operating a test facility, studying the impact of adding purified water to San Vicente Reservoir, completing a cost and energy analysis, and conducting a public outreach and education program to inform San Diegans about the science of water purification.

"The Demonstration Project is playing an important role in determining whether purified water can be a viable option for supplementing San Diego's limited water supplies," said Roger Bailey, Director of the City's Public Utilities Department. "We are truly honored to be recognized for our ongoing work in exploring new water supply solutions for San Diego," added Bailey.

The award provides industry recognition for successful small (less than five-million-gallons-a-day capacity) projects that have made significant contributions to advancing water reuse. The City of San Diego Public Utilities Department is receiving this award for its continued dedication to water reuse and its successful implementation of the Water Purification Demonstration Project. Last year, the WateReuse Association recognized the Demonstration Project's outreach program as the 2011 WateReuse Public Education Program of the Year.

Members of the public are encouraged to register to tour the Demonstration Project's Advanced Water Purification Facility, which explains the project in more detail and provides an up-close look at the test facility. To register, visit the project website at **www.purewatersd.org/tours.shtml**. For a presentation to community, civic or business organizations, email **purewatersd@sandiego.gov** or call **(619) 533-6638**.

The WateReuse Association is a national, nonprofit organization whose mission is to advance the beneficial and efficient uses of high-quality, locally-produced, sustainable water sources for the betterment of society and the environment through advocacy, education and outreach, research, and membership. Across the United States and the world, communities are facing water supply challenges due to increasing demand, drought, depletion and contamination of groundwater, and dependence on a single source of supply.

# # #

Press Release: AWP Facility Tour Group Visits

This is a template of a press release distributed to organizations following their tours of the AWP Facility. These news releases were for publicizing the tour program in organizations’ newsletters.

THE CITY OF SAN DIEGO
PUBLIC UTILITIES

FOR IMMEDIATE RELEASE
[DATE]

MEDIA CONTACTS:
Alma Rife
(619) 980-9560

[ORGANIZATION] Tours
City's Water Purification Demonstration Project

City Studying Feasibility of Purifying Wastewater for Drinking Water

SAN DIEGO – [Members of ORGANIZATION] toured the City of San Diego's Advanced Water Purification Facility on [DATE]. Located in northern San Diego, the Advanced Water Purification Facility is a small-scale facility that purifies one million gallons of recycled water every day to a level similar to distilled water quality.

The facility is one component of the City's Water Purification Demonstration Project that is examining the safety and cost of purifying recycled water. If the project is approved to go full-scale, the purified water would blend with the City's imported supply of raw or untreated water stored in the San Vicente Reservoir. After being treated again at the Alvarado Water Treatment Plant, water from San Vicente Reservoir would become part of the City's drinking water supply. As another component of the Demonstration Project, the City is studying San Vicente Reservoir and the potential effects of adding purified water to it. During the year-long test phase, purified water will not be sent to San Vicente Reservoir or the City's drinking water system; instead, the purified water will be added to the City's recycled water system used for irrigation and industrial purposes.

[INSERT QUOTE FROM ATTENDEE]

Since opening in June 2011, more than [ATTENDANCE NUMBER] people have toured the facility. The [ORGANIZATION] is one of many groups that have toured the facility to better understand the science of water purification. On the tour, guests become familiar with the Demonstration Project and what role the Advanced Water Purification Facility plays in this testing phase. Following an introductory presentation, tour participants take a walking tour through the facility to view the water purification technology equipment up close and hear more about how the purification process works. At the end of the tour, guests see for themselves the purity of the water produced at the facility and compare samples of purified, recycled and tap water.

To register for a tour of the Water Purification Demonstration Project, visit the project website at **www.purewatersd.org/tours.shtml**. For a presentation to your organization, email **purewatersd@sandiego.gov** or call **(619) 533-6638**.

# # #

Advertisement: Open for Tours (English)

This advertisement was published in the Voice & Viewpoint (June 2011), Giving Back Magazine (July 2011), San Diego Monitor (July 2011), Filipino Press (August 2011) and We Chinese in America Weekend (August 2011).

Water Purification | Demonstration Project

OPEN for Tours

The City of San Diego opens the doors this summer to its Advanced Water Purification Facility at the North City Water Reclamation Plant. Join us for a tour of the facility and see how this technology can transform wastewater into one of the purest sources of water in San Diego.

Sign Up Today:

- Visit www.purewatersd.org/tours.shtml to register for a tour.
- Email purewatersd@sandiego.gov or call (619) 533-6638 to schedule a presentation for your organization.

THE CITY OF SAN DIEGO

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Advertisement: Open for Tours (Spanish)

This advertisement was published in El Latino (July 2011) and La Prensa (July 2011).

Water Purification | Demonstration Project

ABIERTO *para Recorridos*

Este verano la ciudad de San Diego abrira las puertas de las instalaciones del Tratamiento Avanzado de Purificacion de Agua(AWP) en la planta de tratamiento North City Water Reclamation Plant. Acompañanos a recorrer las instalaciones y ver como esta tecnologia puede transformar aguas negras en una de las fuentes de agua mas pura en San Diego.

Apuntense Hoy:

- **Visite www.purewatersd.org para registrarse a un recorrido.**
- **Mande un correo electronico a purewatersd@sandiego.gov o llame al (619) 533-6638 para programar una presentacion a su organizacion.**

[redacted]

THE CITY OF SAN DIEGO

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Advertisement: Top 5 Reasons to Tour

This advertisement was published in the Voice of San Diego monthly publication (July 2012).

Top 5 Reasons to Tour San Diego's Water Purification Facility

1. It's fun
2. It's free
3. It's educational
4. It makes you think
5. It makes you say "wow"

Join the thousands who've already seen how wastewater is transformed into purified water.

Water Purification | Demonstration Project

Visit PureWaterSD.org for reservations.

Advertisements: Purely Amazing and Spiderman

The “Purely Amazing” advertisement was featured in two Voice of San Diego e-blasts (July 2012). The Spiderman three-panel rotating graphics advertisment was featured on the Voice of San Diego website (June 2012).

Email Advertisement

Web Advertisement

Three-panel rotating graphics

Media Coverage List (2010-2012)

The following document lists all of the known media coverage of the Water Purification Demonstration Project from 2010 to 2012.

Water Purification Demonstration Project
Media Coverage (2010-2012)

Category	Article Title	Publication Name/ Organizational Affiliation	Date of Coverage
Online	Public Comment: Sewage Recycling	Voice of San Diego	1/21/2010
TV Online	Toilet to Tap Back on the Drawing Board	San Diego 6 News	1/26/2010
Newspaper	Coalition Has Hand in Water Recycling Plan, Council Advances Recycling Project	San Diego Union Tribune	1/27/2010
Online	Toilet-to-Tap Campaign Approved by Council	San Diego News Room	1/28/2010
Online	City Water Usage Up	Voice of San Diego	2/9/2010
Online	Mayor Supports Sewage Recycling Pilot	Voice of San Diego	2/11/2010
Online	Let's Use the Water We Have	San Diego News Room	3/9/2010
Online	The Future of Indirect Potable Reuse	San Diego News Network	3/10/2010
Online	A Guide to Purified Sewage	Voice of San Diego	4/26/2010
Blog	A Primer/Refresher on San Diego's Water Purification Demonstration Project	GrokSurf's San Diego	7/7/2010
Magazine	Council Approves Wastewater Treatment Project	San Diego Metropolitan Magazine	7/28/2010
Radio	Political Analysis: The Legacy of Toilet-to-Tap	KPBS	8/4/2010
Radio	What Role Could Water Reclamation Play in San Diego's Future?	KPBS	8/5/2010
Online	San Diego's Progress with Water Reuse	San Diego News Room	8/6/2010
Online	San Diego to Test Alternative Water Source	San Diego News Room	8/20/2010
Online	Fact Check: The Real Price of Purified Sewage	Voice of San Diego	9/16/2010
Blog	Should San Diego Ozonate its Wastewater for IPR?	GrokSurf's San Diego	10/5/2010
Newspaper	New Source of Drinking Water Hinges on Pilot Project	San Diego Union Tribune	10/11/2010
Blog	"Toilet to Tap"	3-Waters	1/6/2011
Newspaper	City Engineers Tell La Jollans about Water Purification	La Jolla Light	1/12/2011
Newspaper	The Yuck Factor: Get Over It	San Diego Union Tribune	1/23/2011
Blog	La Jolla Residents Get a Distilled Water Lesson	Distilled Water Company	1/24/2011
Newspaper	From Toilets to Tap	USA Today	3/3/2011
Blog	From Wastewater to Drinking Water	State of the Planet/The Earth Institute	4/4/2011
Newspaper	Wastewater Getting New Life Across the County	San Diego Union Tribune	5/15/2011
Online	The Emotion of Wastewater	The Huffington Post	6/12/2011
Online	Will San Diego's Mayor Drink Purified Sewage?	Voice of San Diego	6/30/2011
TV Online	Year Long Study Will Determine if Wastewater Can Be Properly Treated for Drinking	10 News	6/30/2011
TV Online	Can San Diego Go From Toilet to Tap?	NBC News	6/30/2011
Online	Mayor Kicks Off Pilot Project to Test Possible New Source of Drinking Water	SanDiego.gov	6/30/2011
Online	Water Reliability Coalition Supports Water Purification Pilot Project	San Diego Coastkeeper	6/30/2011
Online	City Tests System of Turning Wastewater into Drinking Water	San Diego News Room	6/30/2011
Online	City to Test System that Makes Wastewater Drinkable	10 News	6/30/2011
Newspaper	San Diego Launches Landmark Water Project	San Diego Union Tribune	6/30/2011
Blog	San Diego Reuse Water Purification Plant Opens	OB Rag	7/1/2011
Newsletter		Emerald News	7/1/2011
Newspaper	Purify "Brown" Water to Solve SD Water Crisis	Daily Aztec/San Diego State University	7/10/2011
Newspaper	City Gives Water Reclamation Plant Tours	San Diego Metropolitan Magazine	7/20/2011

Water Purification Demonstration Project
Media Coverage (2010-2012)

Category	Article Title	Publication Name/ Organizational Affiliation	Date of Coverage
Newspaper	City offering tours of water purification plant	La Jolla Light	7/25/2011
Newsletter	Utility Briefs	AWWA Streamlines	7/26/2011
Newsletter	City of San Diego Speculates on Future of New Source of Local Water	ACWA News	7/29/2011
Online	Future of Water on Public Display for San Diego's Water Purification Demonstration Project	WaterTechOnline.com	7/29/2011
Newsletter	San Diego's Pro-active Approach-Tests New Water Facility	SCAP Monthly Update	8/1/2011
Blog	Join us when we tour San Diego's cutting-edge new IPR Demonstration Project	Know Your h2o	8/2/2011
Online	Fact Check: Cleaner Water than Orange County?	Voice of San Diego	8/2/2011
Online	Public Invited to Tour City's Water Purification Demonstration Project	WaterTechOnline.com	8/3/2011
Radio	Recycling Water: A Clear Solution for San Diego	KPBS	8/3/2011
Online	San Diego IPR open to public tours	Desalination and Water Reuse Quarterly	8/4/2011
Blog	Water Recycling: Creating Water So Pure You Can Drink It	San Diego Coastkeeper	8/6/2011
Blog	Breaking the Taboo on "Toilet to Tap"	Ecocentric/TIME Magazine	8/10/2011
Blog	San Diego, Drink It In…	CleanTech Insights	8/26/2011
Blog	Indirect Potable Reuse: It Works!	San Diego Coastkeeper	9/1/2011
Online	Local Experts Discuss Region's Local Water Supply	San Diego News Room	9/14/2011
Online	City's Water Purification Demonstration Project Honored with National Award	SanDiego.gov	9/16/2011
Blog	San Diego's Water Purification Demonstration Project Wins Award	San Diego Surfrider Foundation	9/19/2011
Newsletter	City's Water Purification Demo Project Honored with National Award	San Diego Chapter newsletter/WateReuse Association	10/1/2011
Newspaper	Whets Public's Appetite for More Information	Mission Times Courier	10/7/2011
Online	City Opens Doors to Water Purification Demonstration Project	WaterWorld	10/13/2011
Newspaper	San Diego Frames Water Policy for the Future	San Diego Union Tribune	10/19/2011
Newspaper	A Big Win in the War for Water	San Diego Union Tribune	12/9/2011
Newspaper	City Endorses Plan to Convert Sewage into Drinking Water	North County Times	12/10/2011
Newspaper	Future of Water on Display at San Diego's Water Purification Demonstration Project	U.S. Mayor	12/19/2011
Online	San Diego's Advanced Treatment Facility Viewable on YouTube	Desalination and Water Reuse Quarterly	12/30/2011
Newspaper	Water Recycling Key to U.S. Future	San Diego Union Tribune	1/10/2012
Newsletter	SOS Toastmasters Tours City's Water Purification Demonstration Project	SOS Toastmasters	1/15/2012
Newspaper	Where Toilet to Tap Fears circle the drain	San Diego Union Tribune	1/21/2012
Newspaper	As 'Yuck Factor' Subsides, Treated Wastewater Flows From Taps	New York Times	2/9/2012
Blog	Water Recycling Makes National News	E-Bulletin/California Water Environment Assoc.	2/13/2012
Blog	Spacewater Recycling: Getting Around the Yuck Factor	Water Management:	2/23/2012
Blog	San Diego's Indirect Potable Reuse Proposal Without the Hype	GrokSurf's San Diego	2/27/2012
Blog	Ultra-purified Recycled Water Cleaner Than Imported Water	San Diego Coastkeeper	2/27/2012
Newspaper	Future of Water on Public Display for San Diego's Water Purification Demonstration Project	Mission Valley News/Scoop San Diego	2/27/2012
Blog	San Diego's Indirect Potable Reuse Proposal Without the Hype	Aquafornia.com	2/28/2012
Online	City Officials Put Future of Water on Display at SD facility	SDnews.com	2/29/2012
Blog	San Diego Uses Advance Oxidation to Recycle Wastewater	Spartanwatertreatment.com	2/29/2012

Water Purification Demonstration Project
Media Coverage (2010-2012)

Category	Article Title	Publication Name/ Organizational Affiliation	Date of Coverage
Newspaper	City Officials Put Future of Water on Display at SD facility	Beach and Bay Press	3/1/2012
Newsletter	Future of Water on Display for San Diego's Water Purification Demonstration Project	San Diego Chapter newsletter/WateReuse Association	3/1/2012
Newsletter	Future of Water on Display for San Diego's Water Purification Demonstration Project	Alpine community newsletter	3/5/2012
Online	Students Tour City Water Purification Facility	Francis Parker School website	3/5/2012
Newsletter	[Photo with Caption]	District 4 newsletter	3/21/2012
Blog	Future of Water on Display for San Diego's Water Purification Demonstration Project	My Clean Water Act	3/28/2012
Blog	Future of Water on Display for San Diego's Water Purification Demonstration Project	I Love a Clean San Diego	3/28/2012
Newsletter	Recycled Water is Coming to San Diego	District 6 newsletter	4/1/2012
Newspaper	Taking the Waste Out of Wastewater	New York Times/Sunday Review	4/21/2012
Radio	Mares: Recycled Water	Vermont Public Radio/Commentary Series	4/23/2012
Newspaper	City's Water Purification Demonstration Project Celebrates Drinking Water Week with Open House Tours	Scoop San Diego	5/4/2012
Online	Sewage Plan Envisions Massive Expansion of Wastewater Recycling	Voice of San Diego	5/21/2012
Newspaper	Boosting Reservoirs with Purified Wastewater?	San Diego Union Tribune	5/22/2012
Online	Final Draft of San Diego Water Reuse Scheme Published	Desalination and Water Reuse Quarterly	5/25/2012
Newspaper	Bill Seeks to Streamline Recycled Water Regulations	San Diego Union Tribune	5/27/2012
Blog	San Diego: Improving the Flow to use recycled wastewater	Aquafornia.com	5/28/2012
TV	Reusable Water Not Cheaper: Report	NBC San Diego	5/29/2012
Online	Purifying Sewage: Where the Mayoral Candidates Stand	Voice of San Diego	5/29/2012
Newspaper	Recycling Sewage to Drinking Water Could Save City of San Diego Money: Study	North County Times	6/2/2012
Newspaper	Toilet to Tap Helps Conservation Efforts	San Diego Union Tribune	7/14/2012
Online	In San Diego, Recycled Water Quickly Wins Fans (And They Don’t Even Have It Yet)	National Geographic Daily News	8/30/2012
TV	Wade in the Water	Larry Himmel's In the Neighborhood/CBS8	8/6/2012
Newsletter	San Diego's Water Purification Demonstration Project Showcases Future of Water, Offers Tours	Let's Talk Plants!/San Diego Horticultural Society	8/6/2012
Newsletter	Tour of the Water Purification Facility	Torrey Pines Ski Club newsletter	9/1/2012
Newspaper	San Diego Monitor News' Business Bootcamp Group Visits AWP Facility	San Diego Monitor	10/5/2012
Newsletter	Take a Pure Tour	Waste No Water Newsletter/City of San Diego Water Conservation	Fall 2012
Journal	Changing Public Perception About Water Purification	AWWA Opflow	12/1/2012
Newsletter	Water Purification Tour	Scripps Ranch Newsletter	12/1/2012
Radio	San Diego Seeks a Swifter Current for Water Recycling	KPBS	12/10/2012

Media Clips

A collection of media clips about the Demonstration Project can be found online at www.sandiego.gov/water/waterreuse/demo/articles.shtml or by visiting www.purewatersd.org and clicking on the "News and Publications" link.

Appendix H: Public Outreach and Education

Section 6: Speakers Bureau

Speakers Bureau PowerPoint Presentation

Slides from the regular presentation are included. Other variations of the presentation include a video and a shortened version.

Water Purification Demonstration Project

www.purewatersd.org

What you should know…

- San Diego needs to develop local, reliable sources of water.
- The Water Purification Demonstration Project is examining the use of advanced purified water.
- The purified water goes through multiple advanced treatment steps.
- No purified water is added to the drinking water system during the Demonstration Project.

www.purewatersd.org

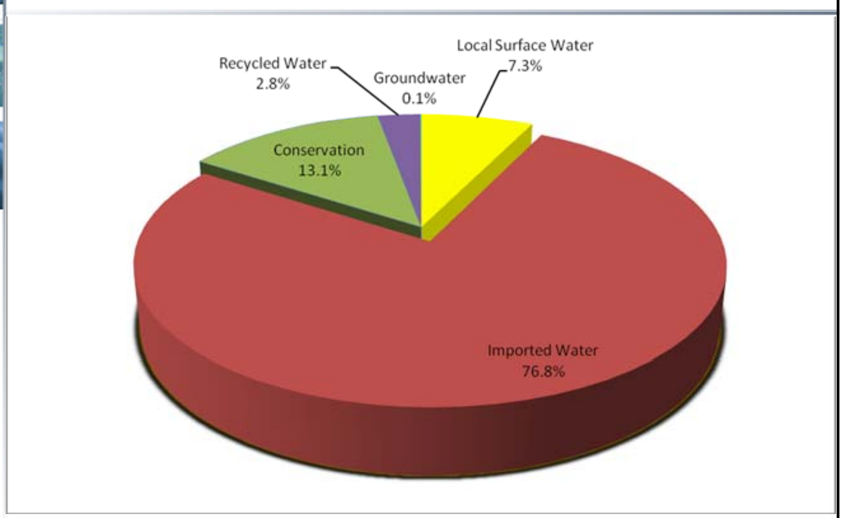
Water Supply Challenges

- Rising costs of imported water
- Pumping restrictions
- Population growth
- Earthquakes

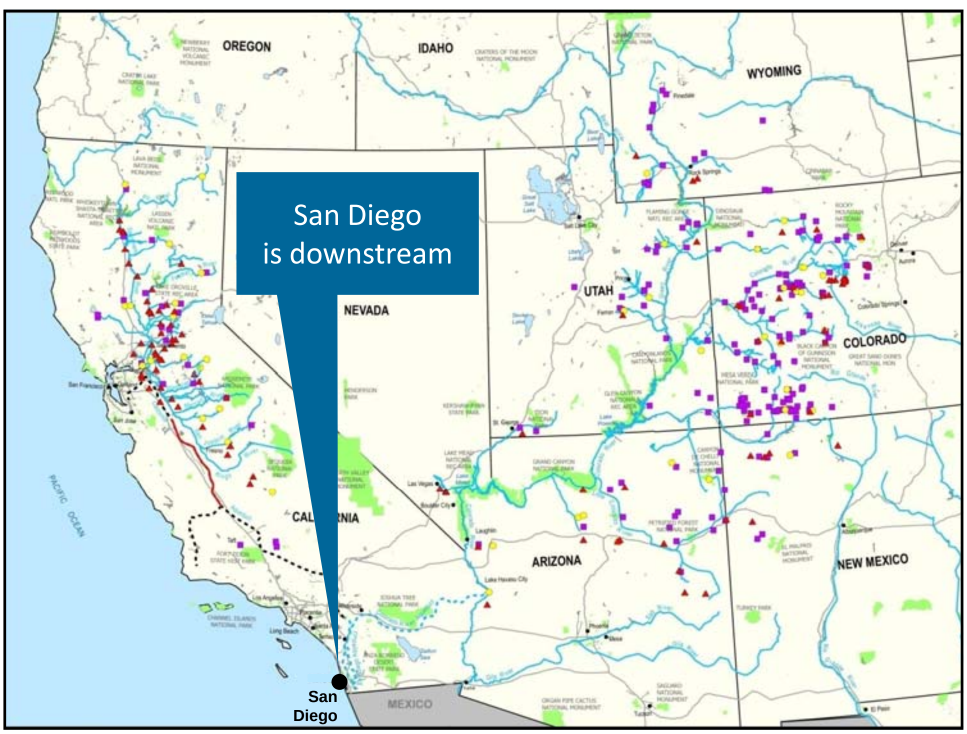
SAN DIEGANS WASTE NO WATER ALL DAY. EVERY DAY.

www.purewatersd.org

WATER SUPPLY: FY 2012
SEVEN YEAR HISTORICAL AVERAGE




California Water Projects
Federal Water Projects
Central Valley Project
Coachella Canal
All American Canal
State Water Projects
Local Water Projects
Mokelumne Aqueduct
Hetch Hetchy Aqueduct
Los Angeles Aqueduct
Colorado River Aqueduct
Bay-Delta
Redding
Sacramento
San Francisco
Fresno
Los Angeles
San Diego
Colorado River


San Diego
is downstream
OREGON
IDAHO
WYOMING
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
MEXICO
San Diego

What is being done…

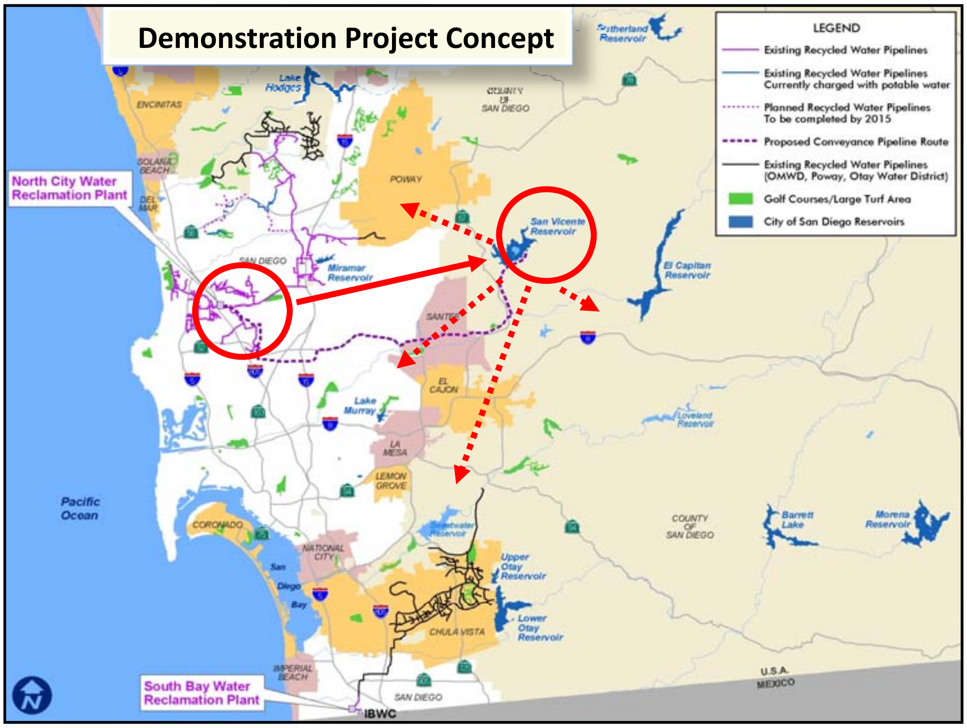
- Water Conservation
- Groundwater Development
- Recycled Water
- The Water Reuse Program

Project Components

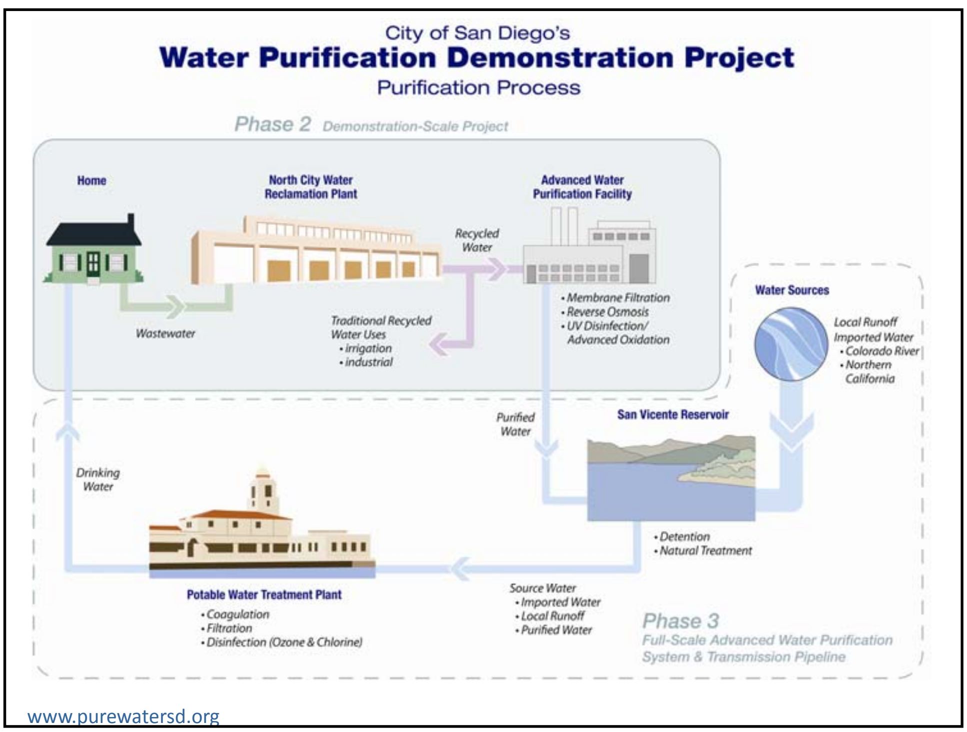
- Operate 1 MGD facility
- San Vicente Reservoir study
- Define regulatory requirements
- Conduct energy and economic analysis
- Public education and outreach

Outcomes

- Validate treatment process
- Gain regulatory approval
- Evaluate cost
- Public acceptance

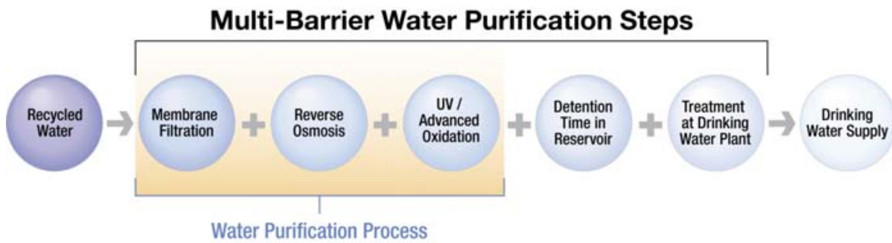


Demonstration Project Concept
LEGEND
Existing Recycled Water Pipelines
Existing Recycled Water Pipelines Currently charged with potable water
Planned Recycled Water Pipelines To be completed by 2015
Proposed Conveyance Pipeline Route
Existing Recycled Water Pipelines (OMWD, Poway, Otay Water District)
Golf Courses/Large Turf Area
City of San Diego Reservoirs
North City Water Reclamation Plant
South Bay Water Reclamation Plant
San Vicente Reservoir
El Capitan Reservoir
Miramar Reservoir
Lake Hodges
Lake Murray
Loveland Reservoir
Barrett Lake
Morena Reservoir
Upper Otay Reservoir
Lower Otay Reservoir
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
SAN DIEGO
SANTEE
EL CAJON
LA MESA
LEMON GROVE
CORONADO
NATIONAL CITY
CHULA VISTA
IMPERIAL BEACH
COUNTY OF SAN DIEGO
Pacific Ocean
San Diego Bay
U.S.A.
MEXICO
IBWC



City of San Diego's
Water Purification Demonstration Project
Purification Process
Phase 2 Demonstration-Scale Project
Home
North City Water Reclamation Plant
Advanced Water Purification Facility
Recycled Water
Wastewater
Traditional Recycled Water Uses
• irrigation
• industrial
• Membrane Filtration
• Reverse Osmosis
• UV Disinfection/ Advanced Oxidation
Water Sources
Local Runoff
Imported Water
• Colorado River
• Northern California
Purified Water
San Vicente Reservoir
Drinking Water
• Detention
• Natural Treatment
Potable Water Treatment Plant
• Coagulation
• Filtration
• Disinfection (Ozone & Chlorine)
Source Water
• Imported Water
• Local Runoff
• Purified Water
Phase 3
Full-Scale Advanced Water Purification System & Transmission Pipeline
www.purewatersd.org

Water Purification Process

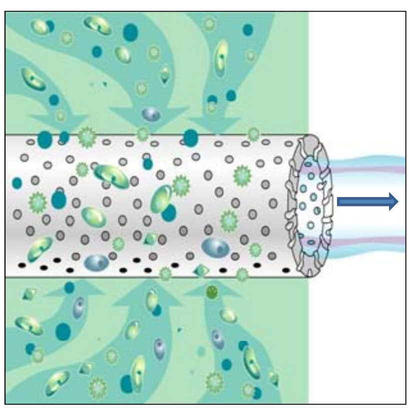


Microfiltration & Ultrafiltration

Reverse Osmosis

Ultraviolet Light / Hydrogen Peroxide

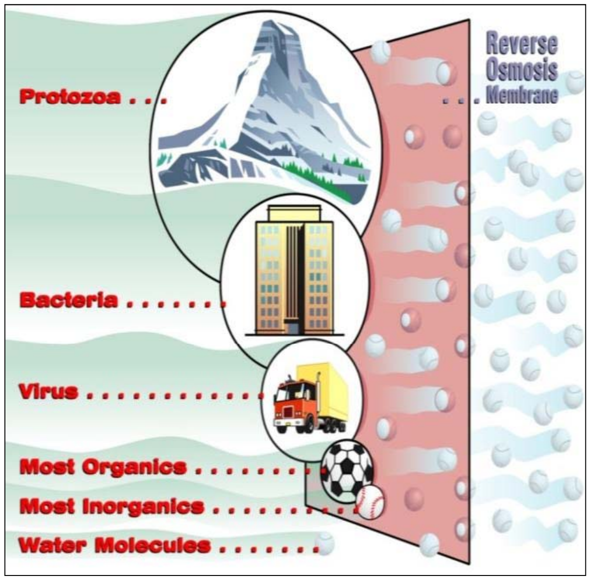
Membrane-filtration: Step One



- Hollow fiber with holes in the sides
- Used to make baby food, purify medicines, fruit juices and more
- Excellent pre-filter before reverse osmosis

www.purewatersd.org

Reverse Osmosis: Step Two



- Same technology used by bottled water companies
- Forces water under high pressure through sheets of plastic membrane
- Demineralizes and purifies water

Ultraviolet Light plus H_2O_2: Step Three


Ultraviolet (UV) plus H_2O_2 Disinfection

- High-intensity light and hydrogen peroxide
- Creates advanced oxidation reaction, essentially destroys anything in the water

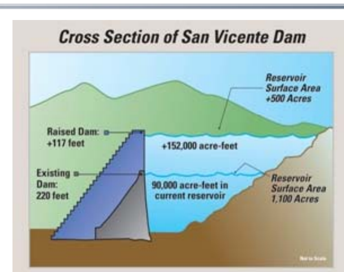
www.purewatersd.org

Water Purification: a proven technology

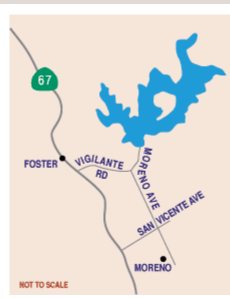
Upper Occoquan Service Authority

Leader in Water Reclamation and Reuse

San Vicente Limnology and Reservoir Detention Study



- Dam to be raised 117 feet
- Currently 90,000 acre-feet
- After dam raise 242,000 acre-feet
- Construction duration 2009 – 2013
- Augmentation would improve water quality



Project Benefits

- Local and sustainable supply of drinking water
- Increased use of recycled water
- Decreased dependence on imported water
- Less energy than imported water
- Improved quality of reservoir water
- Positive impact on environment

www.purewatersd.org

Independent Advisory Panel

Panel included:

- Ph.D's (9)
- Experts in water quality & treatment technology
- Experts in regulatory issues
- Local stakeholders
- O. C. Groundwater Replenishment System management

Public Outreach & Education

- Speakers Bureau
- Community Events
- Facility Tours

www.purewatersd.org

Open for Tours - A Site to See

Register online at www.PureWaterSD.org

Final Report

- Results of the Demonstration Project will be available in a comprehensive report.
- City Council will decide whether to accept the report, which could pave the way for the development of a full-scale water purification project in San Diego.

Water Quality Results

- Exceptional overall water quality, met all project treatment goals
- Purified water met all drinking water standards
- Equipment at each step in the treatment process is performing properly

WRC WATER RELIABILITY COALITION

WWW.SDWATERSUPPLY.COM

- BIOCOM
- Building Industry Association of San Diego
- Building Owners and Managers Association, San Diego Chapter
- Citizens Coordinate for Century 3
- Coastal Environmental Rights Foundation
- Empower San Diego
- Endangered Habitats League
- Environmental Health Coalition
- Friends of Infrastructure
- Industrial Environmental Association
- National Association of Industrial and Office Properties
- San Diego and Imperial Counties Labor Council
- San Diego Audubon Society
- San Diego Regional Economic Development Corporation
- San Diego Coastkeeper
- San Diego County Apartment Association
- San Diego County Taxpayers Association
- San Diego Regional Chamber of Commerce
- San Diego River Park Foundation
- Surfrider Foundation, San Diego Chapter
- Sustainability Alliance of Southern California
- Utility Consumers' Action Network

Turning the Tide

2008...


The San Diego Union-Tribune.

UNION-TRIBUNE EDITORIAL

No toilet-to-tap

Special water rate hike unwarranted

September 8, 2008

High gasoline prices, rising food costs and upwardly adjustable mortgage payments may be sapping your paycheck, but they have not deterred the City Council from voting today on a special water rate hike for the infamous toilet-to-tap scheme.

At issue is an untested process to take sewage effluent, treat it heavily and then dump it into the San Vicente Reservoir, the source of much of San Diego's drinking water. This would mean, quite literally, taking your toilet water and returning it to your tap. Yet advocates of the plan abhor the apt toilet-to-tap sobriquet, preferring instead to call it "indirect potable reuse."

But no matter what euphemism you employ, the project is a colossal waste of ratepayer dollars and, just as important, fraught with serious public health concerns.

Over Mayor Jerry Sanders' well-justified veto, the City Council is rushing head long to build a $12 million toilet-to-tap demonstration plant that may or may not meet the approval of the California Department of Health, which must sign off on it. Toward that end, the City Council will vote today on a special water rate increase of 2.3

...2011


Edward R. Moss
Publisher

Jeff Light
Editor

THE SAN DIEGO U-T UNION-TRIBUNE

The Editorial Board

EDITORIAL

THE YUCK FACTOR: GET OVER IT

As San Diego sprawls above 3.5 million people countywide in just 10 more years, and a projected 4.4 million by 2050, the greatest threat to our economic health and quality of life is an uncertain supply of water. This urban cul-de-sac at the bottom of California is at the tail end of the pipelines that deliver 80 percent or more of our water. That means we are heavily dependent on the mercy of others, and that is not comforting.

San Diegans have more than proved themselves willing to conserve; the city uses less water in real terms today than it did with a smaller population 20 years ago. That will continue to be a crucial part of the region's water strategy for decades. So, too, will be the development of new sources, such as desalination. And, of course, political battles to rescue the Sacramento-San Joaquin Delta from environmental collapse in order to keep Northern California water flowing south will be

scaping and industrial processes, then purify and scrub it some more to nearly distilled water standards. The demonstration project is to produce 1 million gallons a day for a year, during which it will be continually monitored and studied, but not distributed for public consumption. If it proves safe and affordable, the city could then consider its expansion to a permanent plant that could produce up to 16 million gallons a day, which would be piped to San Vicente Reservoir.

Frankly, there is not that much to demonstrate, at least scientifically.

Information

Visit: www.purewatersd.org

Email: purewatersd@sandiego.gov

Call: (619) 533-7572

Speakers Bureau Flier

Schedule your presentation today!

City of San Diego

Water Purification Demonstration Project

Did you know?

The City of San Diego imports approximately 85 to 90 percent of its water supply and recent court ordered restrictions have reduced the amount of water that reaches San Diego.

What is being done?

San Diego's Water Purification Demonstration Project is examining the use of advanced water purification technology on high quality recycled wastewater to provide a safe, local and sustainable water supply for the future.

We would like to make a presentation to your group

The presentation will include:

- ◊ San Diego's need for a local, reliable water supply
- ◊ The purpose of the Water Purification Demonstration Project
- ◊ The advanced water purification process
- ◊ The potential use of advanced purified water for Reservoir Augmentation in the future

Recycled Wastewater

Please contact the Speakers Bureau Program to schedule a presentation

City of San Diego
Public Utilities Department

Speakers Bureau Program

Phone: (619) 533-6638

Email: purewatersd@sandiego.gov

Visit **www.purewatersd.org** for more information.

Speakers Bureau Completed Presentations
(March 2010 – December 2012)

A list of the groups that received Demonstration Project speakers bureau presentations.

WATER PURIFICATION DEMONSTRATION PROJECT
SPEAKERS BUREAU (MARCH 2010 – DECEMBER 2012)

TOTAL COMPLETED PRESENTATIONS	**132**
(Through December 2012)	

COMPLETED PRESENTATIONS

WateReuse Association (CA Section)	March 9, 2010
Independent Rates Oversight Committee	May 10, 2010
American Water Works Association	June 21, 2010
Industrial Environmental Association	July 8, 2010
U.S. Bureau of Reclamation	July 13, 2010
SD County Water Authority Capital Improvement Program	July 13, 2010
Tierrasanta Community Council	July 21, 2010
Johnson & Johnson	July 28, 2010
Mt. Zion Baptist Church, Missionary Department	August 4, 2010
San Diego Metro Wastewater Joint Powers Authority	August 5, 2010
Otay Mesa Property Owners	August 5, 2010
Fox Canyon Neighborhood Association	August 10, 2010
Otay Mesa Nestor Community Planning Group	August 11, 2020
Greater Golden Hill Planning Group	August 11, 2010
SD County Water Authority General Managers	August 17, 2010
Otay Mesa Community Planning Group	August 18, 2010
Pacific Beach Town Council	August 18, 2010
Catfish Club	August 20, 2010
Serra Mesa Community Council	August 25, 2010
SD County Water Authority Board	August 26, 2010
San Carlos Area Council	September 1, 2010
Rancho De Los Penasquitos Town Council	September 2, 2010
Normal Heights Community Planning Group	September 7, 2010
Rancho De Los Penasquitos Planning Board	September 8, 2010
Serra Mesa Recreation Council	September 8, 2010
Tierrasanta Recreation Council	September 9, 2010
La Jolla Town Council	September 9, 2010
Redwood Village Community Council	September 13, 2010
Allied Gardens Recreation Council	September 13, 2010
Lake Murray-San Carlos Recreation Council	September 15, 2010
SD County Medical Society	September 15, 2010

WATER PURIFICATION DEMONSTRATION PROJECT
SPEAKERS BUREAU (MARCH 2010 – DECEMBER 2012)

Allied Gardens Kiwanis Club	September 16, 2010
BOMA San Diego, Government Affairs Committee	September 20, 2010
Mission Valley Community Council	September 21, 2010
San Diego Community Planners Committee	September 28, 2010
Public Utilities Executive Team	September 29, 2010
SD Coastkeeper's Legislative Summit	September 30, 2010
City Heights Area Planning Committee	October 4, 2010
Miramar Ranch North Planning Committee	October 5, 2010
Ocean Beach Planning Board	October 6, 2010
City of San Diego Public Utilities Department, Employee Services and Internal Controls	October 7, 2010
East Village Business Improvement District	October 7, 2010
Southeastern San Diego Planning Group	October 11, 2010
University Community Planning Group	October 12, 2010
North Bay Community Planning Group	October 20, 2010
Peninsula Lions Club	October 20, 2010
Rancho Bernardo Community Planning Group	October 21, 2010
East Village Community Action Network	October 21, 2010
Ocean Beach Community Development Corporation	October 26, 2010
California Water Environment Association	October 28, 2010
South County Economic Development Council	October 29, 2010
National Association for the Advancement of Colored People	November 4, 2010
Clairemont Town Council	November 4, 2010
Mission Bay Park Committee	November 9, 2010
La Jolla Shores Association	November 10, 2010
Rolando Community Council	November 16, 2010
Olivenhain Municipal Water District	November 17, 2010
Del Mar Rotary	November 18, 2010
San Diego Metro Wastewater Joint Powers Authority	December 2, 2010
U.S. Environmental Protection Agency/ Australian Government Representatives	December 6, 2010
Mission Valley Planning Group	January 5, 2011
La Jolla Community Planning Association	January 6, 2011
Pacific Beach Kiwanis Club	January 13, 2011
El Cerrito Community Council	January 20, 2011

Customer Care Solutions	January 25, 2011
Del Cerro Action Council	January 27, 2011
Barrio Logan Project Area Committee	February 16, 2011
Point Loma High School	February 25, 2011
SD County Water Authority, Conservation Action Committee	March 14, 2011
Uptown Planners	April 5, 2011
Blacks in Government	April 6, 2011
Girl Scouts Eco-Action Workshop	April 9, 2011
Black American Political Action Committee	April 16, 2011
American Society of Civil Engineers, Pipeline Group	April 21, 2011
Point Loma Rotary	April 29, 2011
Fairmount Park Neighborhood Association	May 19, 2011
Point Loma Kiwanis Club	June 7, 2011
Allied Garden Optimist Club	June 9, 2011
Del Mar Mesa Planning Group	June 9, 2011
Sunrise Optimist Club	June 14, 2011
San Ysidro Planning Group	June 20, 2011
La Jolla Kiwanis Club	July 8, 2011
Elementary Institute of Science	July 20, 2011
Ramona Kiwanis Club	August 6, 2011
Del Mar/Solana Beach Optimist Club	August 17, 2011
Ocean Beach Town Council	August 24, 2011
City of San Diego Engineering and Program Management	August 30, 2011
Torrey Pines Rotary	August 31, 2011
La Jolla Golden Triangle Rotary	September 2, 2011
Jamacha Community Council	September 12, 2011
San Diego County Water Authority "Water Talks"	September 13, 2011
Bankers Hill Neighborhood Association	September 19, 2011
Scripps Institute of Oceanography Symposium	September 20, 2011
ACWA Continuing Legal Education Workshop	September 22, 2011
El Cajon Lions Club	October 3, 2011
6th Annual Joint ACWA Regions Fall Event	October 19, 2011
SD County Water Authority Board	December 8, 2011
CONVAIR/220 Amateur Radio Club	December 14, 2011
SDSU, College of Extended Studies	January 6, 2012

American Society of Civil Engineers, General Members	January 24, 2012
St. Therese Academy, 6th Grade Class	March 14, 2012
Mission Lions Club	March 19, 2012
Assembly Water Parks & Wildlife Committee Hearing	March 20, 2012
Sweetwater Valley Civic Association	April 4, 2012
San Diego Therapeutic Recreation Services	April 6, 2012
University Heights Community Association	May 3, 2012
U.S. International Boundary and Water Commission Citizen's Forum	May 10, 2012
City Heights Town Council	June 5, 2012
Coalition of Neighborhood Councils	June 11, 2012
Emerald Hills Town Council	June 12, 2012
Skyline-Paradise Hills Community Planning Committee	July 10, 2012
Industrial Environmental Association, Water Committee	July 12, 2012
Coalition of Neighborhood Councils	July 23, 2012
Broadway Heights Community Council	July 26, 2012
San Diego Green Building Council	August 15, 2012
Mira Mesa Community Planning Group	August 20, 2012
Eco Rotary Club Solana Beach	August 30, 2012
African American Genealogist Research Group	September 8, 2012
The Palavra Tree	September 11, 2012
San Diego County Water Authority, Water Planning Committee	September 27, 2012
Rancho Bernardo Recreation Council	October 3, 2012
Carmel Mountain Ranch Community Committee	October 10, 2012
Chollas View Neighborhood Council	October 23, 2012
Annual Environmental Summit Conference	October 23, 2012
The Southern California Water Dialogue	October 24, 2012
La Jolla Village Community Council	October 24, 2012
Skyline Hills Recreation Council	October 25, 2012
UCSD Occupational/Environmental Health Class	October 30, 2012
San Pasqual/Lake Hodges Planning Group	November 1, 2012
Cuyamaca College Water Resources Management Class	November 26, 2012
International Right of Way Association	November 28, 2012
Madison High School Engineering Classes	December 4, 2012

Appendix H: Public Outreach and Education

Section 7: Internal Department Communications

Pipeline Newsletter Article: December 2010

A Look at New, Local Options for Water

Water Purification | Demonstration Project

Today, the majority of San Diego's water supply comes from imported sources that are becoming more expensive and less reliable. In 2004, the City launched a three-phased Water Reuse Program (Program) to address the water supply crisis by exploring local solutions for future water supply reliability

Phase one of the Program was the City' s 2005 Water Reuse Study (Study). The Study provided a comprehensive evaluation of all viable options to maximize the use of recycled water produced by the City's two water reclamation plants. In addition, the Study analyzed and researched the health effects of various water reuse options. The Study concluded that reservoir augmentation at the City's San Vicente Reservoir is the preferred option for maximizing the use of the City's recycled water supply. Reservoir augmentation is a multi-step process that includes sending the advanced purified water to a reservoir to blend with existing water supplies and then treating the blended water again to be distributed as drinking water. A broad-based group of City residents participated in an American Assembly process to review the Study findings. The American Assembly reached the same conclusion that reservoir augmentation was the most viable use of highly treated recycled water for San Diego, and that it could provide a local, reliable supply of water crucial to the City's future.

Based on the final draft report that summarized the Study results, the City Council commissioned the second phase of the Program: the Water Purification Demonstration Project (Demonstration Project). The purpose of this phase is to further explore the option of reservoir augmentation by demonstrating the project on a small scale. The Demonstration Project, which is currently underway, is examining the use of advanced water purification technology to purify highly treated recycled wastewater that could potentially be added to the "raw" water (water prior to being treated) in a local reservoir. No purified water will be sent to the reservoir during the demonstration phase.

An Advanced Water Purification Facility is being built and will operate for about one year to produce approximately 1 million gallons of purified water per day A study of the San Vicente Reservoir is also being conducted to test the key functions of reservoir augmentation and an independent advisory panel of experts is providing oversight on project research. The research will determine if the purification system satisfies all water quality, safety and regulatory requirements of the California Department of Public Health, and what will happen if the purified water is added to the reservoir. The Demonstration Project is scheduled to conclude at the end of 2012.

If the Demonstration Project meets regulatory requirements and provides evidence that a full-scale project would be viable, the City may implement a full-scale reservoir augmentation project. This would potentially be the third and final phase of the Water Reuse Program. In this potential phase, the advanced treated water would be added to the San Vicente Reservoir. The blended water from the reservoir would go to a drinking water treatment plant where it would be treated and become part of the City's drinking water supply.

A major component of the Demonstration Project is an extensive education and outreach program, which includes public presentations, the distribution of information at community events and on the project web site, and tours of the Advanced Water Purification Facility once it is completed in the spring of 2011. Visit www.purewatersd.org to view informational materials and to learn more about outreach activities related to the Demonstration Project.

60 Days without a Sewer Overflow and a New Record in Sight

A stretch of 60 consecutive days without a sanitary sewer overflow has Wastewater Collection Division staff on target for another record-breaking year There were no spills in the entire system from early September through November 4, 2010, a mark unequalled in modern WWC history. The total from 2009 was 38 spills, compared to the benchmark year of 2000 when there were 365 spills system-wide. Look for the full story in the January issue of *Pipeline*.

Check Out What's New on Department's Intranet Site

A new feature called "Department Fact Sheets" has been added to the Employee Resources section of the Department Intranet: http://publicutilities. There are fact sheets on the Department, providing an overview of the complex systems we operate and maintain, on rate-related information that may help our customers better understand why rate increases occur and how to keep their bills down, as well as various programs and resources.

Pipeline Newsletter Article: March 2011

Serious About Service

Congratulations to the following Public Utilities Department employees for their continued outstanding service to the City.

Edison Lomibao	35	Darlene Morrow-Truver	30
Ahmad Rashada	25	Jimmy Evans	25
Nancy Garcia	25	Kenneth Stanley	25
Rodrigo Rocha	25	Steven Meyer	25
David Schlickman	25	Maureen Brungardt	25
Danilo Manglicmot	25	James Wiley	25
Richard Hopson	20	Karen Anderson	20
Manuel Delao	20	David Koonce	20
Michael Vogl	20	Freddie Wilkins	20
Carmel Wong	20	Walter Cooke	20
Henrietta Crowder	20	Gregory Diaz	20
Josue Bueno	20	Viviana Castellon	20
David Haney	20	David Venable	20
Albert Gatavasky	20	Gonzalo Gonzales	20
Kristen Ikeda	20	Michael Joslyn	20
Cha Moua	20	Victor Van Wey	20
Andre Macedo	20	Kris Witczak	20
Neil Tran	20	Skyla Wallmann	20
Raul Romero	20	Michael Elling	20
Salvador Sandoval	20	Timothy Labadie	20
Stacy Carey	20	Mitch Dornfeld	20
Curt Deloatch	15	Jacqueline Hall	15
Jennise Milton	15	Harold Harris	15
Virginia Basilan	15	Elvira Baluyot	15
Jose Guerrero	15	Marc Hall	15
Yolanda Reynoso-Martin	15	Margarita Vasquez	15
Zohra Alexander	15	Alejandro Serafico	15
David Marlow	15	Oscar Rafael	15
Reynaldo Sacro	15	Carlos Nunez	15
Nestor Abiva	15	Alberto Ragucos	15
Eddy Mata	15	Rosalito Cataulin	15
Roberto Cuevas	15	David Mills	15
Rae Brown	15	Hector Martinez	15
Navareto Alfaro	15	Laura Gaugh	15
Erica Tilaro	10	Vichai Stanley	10
Norma Quintero	10	Jaime Jacinto Jr	10
Kenneth Hood	10	Danilo Pareja	10
Ellen Hutter	10	Deloris Torres	10
Carmel Honeycutt	10	Maria Carmela De Jesus	10
June Olson	10	Minh Phan	10
Douglas Campbell	10	Greg Schlimme	10
Denise Lopez	10	Dan Daft	10
Mike Daoud	10	Enrique Blanco	10
Li Johnson	10	Irma Bolio	10
Adriano Feit	10	Paul Powell	10
Dellanira Bravo	10	Matthew Tomas	10
William Eames	10		
James Mikulovsky	5	Colette Parker	5
Daniel Sanchez	5	Juan Roman Magdaraog,	5
Reynaldo Novencido	5	Yosef El Talmas	5

USA TODAY

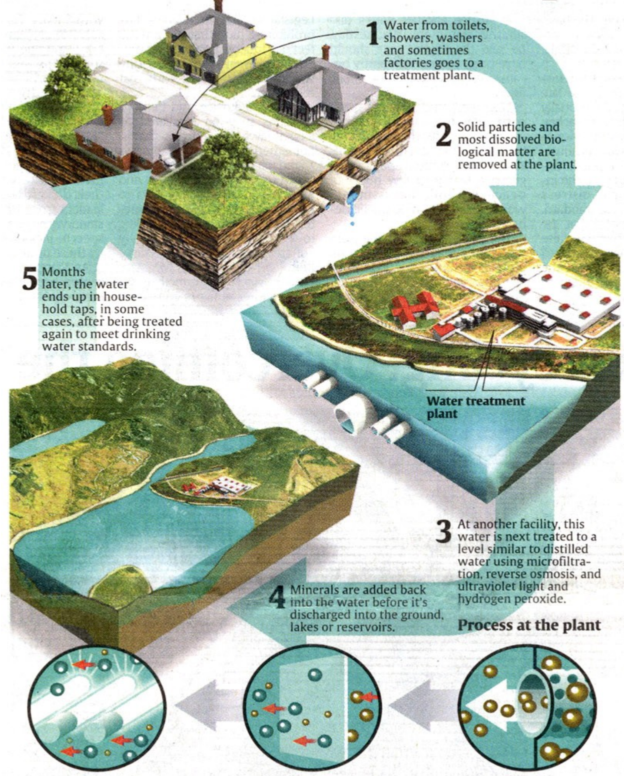
NO. 1 IN THE USA • USATODAY.COM

THURSDAY, MARCH 3, 2011

COVER STORY

From toilets to tap

As water becomes more precious, more drinking water will come from treated sewage. Here's how it works.



Sources: Orange County Water District, PUB (Singapore's water agency), Water technology expert Andrew Benedek, San Diego Public Utilities Department

Reporting by Kathy Chu, USA TODAY; graphic by Karl Gelles, USA TODAY

By Kathy Chu
USA TODAY

SINGAPORE — This island nation is aggressively promoting a solution to the water scarcity that vexes countries worldwide: recycling toilet water to drink.

It's an idea that many people find revolting. But, in Singapore at least, the nearly 5 million residents largely seem to have accepted it as necessary.

"In the past, we had to get water from another country, but what happens if the ties between the two countries are jeopardized?" asks Khaiting Tan, 20, a student at Nanyang Technological University in Singapore. "It's better to be self-reliant."

Once heavily dependent on neighboring Malaysia for its water supply, Singapore is unapologetically recycling sewage and other wastewater in a way that the city-state believes will help make it self-sufficient. The treated water — which Singapore claims is nearly as pure as distilled water — is used largely for industrial purposes, including making semiconductors and powering air-conditioning systems. But increasingly, it's also running out of Singaporeans' taps.

Wastewater has long been recycled for agricultural and industrial purposes. But only a few places in the world, including Singapore, have been bold enough to add it to the drinking water supply. The technology — if it gains wider public acceptance — could change the face of potential water-rights disputes in places such as the Unit-

Please see COVER STORY next page ►

San Diego's and other cities' Indirect Potable Reuse Projects make the front page, above-the-fold coverage in *USA TODAY*. To check out the full article, visit the following link:http://www.usatoday.com/money/industries/environment/2011-03-03-1Apurewater03_CV_N.htm

Pipeline Newsletter Article: April 2011

PIPELINE

PUBLIC UTILITIES MONTHLY UPDATE

April 2011

Message from the Director

Over the last couple of years, we've been taking a hard look at our department, branches, divisions and programs. During these difficult economic times, it is important for every facet of the City to be as efficient as possible. The Public Utilities Department needs to streamline and improveAs a result, we are consistently assessing what we do, why we do it, and whether we can do it better

It's not an easy process, and some choices have been difficult. However, the end result will be an improved Public Utilities Department that better serves our customers.

Already much has been done. Following the merger of Water and Wastewater, an internal study found many ways we could cut costs and work better togetherSome recent changes are described in this issue of PipelineWe overhauled the Department's Rewards & Recognition program (see page 3), and we're redoing the lobby of MOC to provide better customer service (see page 2). An update to the Bid to Goal program can be found on page 4.

More changes will be coming, and we will do our best to keep you informed on a regular basis. I thank all employees for their hard work and their patienceAs always, your ideas on how we can function better and more efficiently are important and welcome. Please make your suggestions to your supervisors for consideration.

Roger Bailey

Mark Your Calendars

April 15 - Tennis Tournament Sign-Up Deadline

Please see story on page 2 of this newsletter for more details about this event.

April 17 - Earth Fair

The annual Earth Fair will be held in Balboa Park from 10 a.m. to 5 p.m. The event regularly attracts around 70,000 people. If you're among them, stop by the Public Utilities booth and say hello to co-workers from Water Conservation, Wastewater Operations, and the Water Purification Demonstration Project outreach team. Construction & Maintenance will also be providing a water wagon.

April 28 - Take Your Sons & Daughters to Work

The annual Take Your Sons & Daughters toWork Day will be hosted by the City of San Diego and the National Management Association, City of San Diego chapter. In an effort to promote careers in government, the Public Utilities Department will participate in this event by hosting a booth display of services (programs/operations/equipment) in the Concourse Plaza between 11 a.m. and 1 p.m.

If you would like to attend this event's activities in the Concourse Plaza, you must request pre-approval from your supervisor and utilize annual leave to cover the time you are away from work (excluding your normal lunch break time).

For additional information about Take Your Sons & Daughters to Work Day, contact Margaret Wyatt, Human Resources Section Manager, at 858-29-26467 or 619-961-6696.

Pipeline Newsletter Article: May 2011

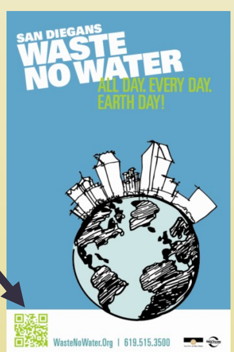
Out & About

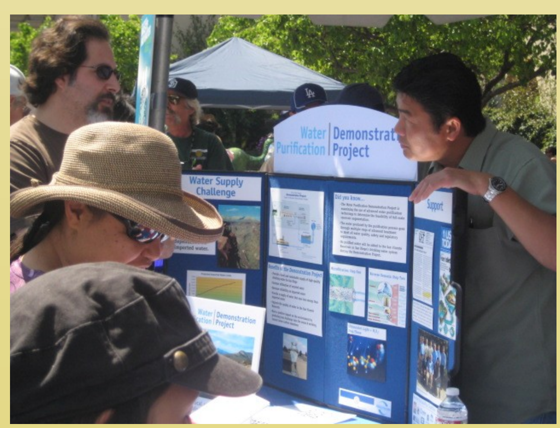
Take Your Daughters & Sons to Work

In an effort to promote careers in government, the National Management Association hosted the City's annual "Take Your Daughters & Sons to Work Day," targeted to girls and boys ages 8 through 12, on Thursday, April 28, 2011. Staff from Wastewater, Conservation and the Water Purification Demonstration Project were on hand to inform visitors of the department's efforts and initiatives.

Earth Fair

On April 17, Department staff participated in the annual Earth Fair in Balboa Park. The event drew roughly 60,000 attendees interested in environmental sciences and sustainability practices. Water and Wastewater staff hosted a booth to educate the public on the latest programs, projects, and rebates. In an effort to minimize the distribution of paper materials guests with smart phones were able to scan a posted bar code and access department materials online.





= Scannable bar code

Pipeline Newsletter Article: June 2011

PIPELINE

PUBLIC UTILITIES MONTHLY UPDATE

June 2011

A Message from the Director

There is always something new and interesting going on in the Public Utilities Department, but what's going on at the North City Water Reclamation Plant this month promises to have a profound effect on our future water supplies. Marsi Steirer, Deputy Director of the Long-Range Planning and Water Resources Division, explains: "We are excited to begin operations this June at the Advanced Water Purification Facility (AWP Facility). Located at the North City Water Reclamation Plant, this facility is part of the City's Water Purification Demonstration Project, which is examining the use of water purification technology on recycled water. Additional components of the Demonstration Project include a study of San Vicente Reservoir to determine the potential of

augmenting the reservoir with purified water, an analysis of the cost to operate the facility, an independent advisory panel of experts to provide oversight on the entire process, and ongoing public outreach activities. The AWP Facility will operate for one year and will produce approximately 1 million gallons of purified water every day. The process includes three treatment barriers that are being tested and monitored at the AWP Facility: membrane filtration, reverse osmosis and advanced oxidation with ultraviolet disinfection and hydrogen peroxide. Purified water will be added to the recycled water distribution system and not to the drinking water supply during this testing period."

Pipeline Newsletter Article: July 2011

PIPELINE

PUBLIC UTILITIES MONTHLY UPDATE

July 2011

Message from the Director

Roger Bailey

Late in June, the Mayor announced that our Department would be absorbing $8.75 million in costs rather than passing them onto our customers (see announcement below). This means during the next fiscal year, we in the Public Utilities Department are going to have to be even more vigilant in our efforts to continually improve and become more efficient.

We have done great things in the two years since the merger of the Water Department and the Wastewater Department. Our workforce has shrunk significantly. I am well aware that we are being asked to do more with less. Fortunately, our ethic of finding increased efficiencies, of seeking out new ways to do our jobs better and faster, continues to pay off for our Department and for the citizens of San Diego.

We have completed a very successful year and we have many exciting programs on the very near horizon. We continue to reap prestigious local and national awards (check out our awards page at http://www.sandiego.gov/publicutilities/pdf/100927departmentawards.pdf), our Field Academy, Management Academy and Mentorship Programs continue to thrive and we keep getting great suggestions through our STAR Program.

Coming up this month, we will launch Customer Care Solutions, an entirely new billing system that will allow us to help customers quicker and with more information and give customers new ways to see and pay their bills. We also are well under way with our Water Purification Demonstration Project. This includes free tours at the Advanced Water Purification Facility at the North City Water Reclamation Plant.

I would like to thank everybody for working hard at finding better and more efficient ways to do our jobs and fulfill our mission to ensure the quality, reliability and sustainability of our water and wastewater services for the benefit of ratepayers and all the citizens of San Diego. It is because of all your effort and ability that we are able to help San Diegans by keeping the cost of water as low as possible.

MAYOR JERRY SANDERS

FACT SHEET

CITY WILL NOT RAISE WATER RATES ON SAN DIEGANS DESPITE LATEST RATE HIKE BY WHOLESALERS

Public Utilities Department will absorb additional $8.75 million cost

The city will not raise water rates next fiscal year even though the city's water wholesaler voted today to increase the price of water by more than seven percent, Mayor Jerry Sanders announced today. The city will be forced to pay an additional $8.75 million in wholesale water costs next fiscal year as a result of today's vote by the San Diego County Water Authority, whose rates were hiked by the Metropolitan Water District in Los Angeles.

"The cost of water is an enormous concern for everyone in this city, from the families trying to keep their households solvent to the businesses struggling through the worst economy since the 1930s," the mayor said. "We are doing everything in our power to postpone any future water-rate increases as long as possible."

To prevent any rate increases for Fiscal Year 2012, the city's Public Utilities Department is taking a variety of steps to pay for the increased price of its wholesaler water. These measures include everything from maximizing the use of local water supplies to keeping vacant jobs open as long as possible. San Diego reservoirs are higher than normal because of the wet winter and cool spring, meaning the city has the option of buying less water from its wholesalers.

Pipeline Newsletter Article: August 2011

PIPELINE

PUBLIC UTILITIES MONTHLY UPDATE

August 2011

A Message from the Director

Roger Bailey

As we continue to move forward in this new fiscal year, I would like to reaffirm the importance of customer service. Our jobs exist for the sole purpose of ensuring excellence in the delivery of water, wastewater and recycled water services for San Diego residents and businesses. It's that simple.

We do a tremendous job of this and I cannot thank you enough for taking this role very seriously every day. While we are public servants who derive satisfaction from making a difference in our community, we must continue to raise the bar for ourselves when it comes to customer service.

One of the primary ways we interact with our customers is through our Customer Support Division and the Department's billing system. Providing accurate, efficient and easy billing options for our customers is a crucial part of our service delivery.

I am very pleased to report that we have successfully transitioned to a new Customer Care system based in SAP that is providing many new enhancements for our customers. While most of San Diego was enjoying time with family and friends over the long Fourth of July holiday weekend, a crack team of Department staff, consultants and others were working tirelessly on the final details of a two-year effort to launch the new system. The proverbial switch was flipped at 8:00am on July 5 and the new system is now providing enhanced options for our customers. This project was managed extremely well and that speaks volumes for all of those who dedicated their talents to this significant effort.

Speaking of dedication, another recent coup for the Department was the opening of the Water Purification Demonstration Project. This vital project has been a goal for the Department for several decades. As the Mayor led a press conference for television, radio and print media, with the Advanced Water Purification facility actually purifying water in the background, it was apparent to all present that we are progressing toward developing more sustainable water supplies for future generations of customers. The public will continue to learn more about this project through tours and our active speakers bureau.

Please enjoy reading more about these and other accomplishments, updates and news in this issue of *Pipeline*. Again, thank you for making customer service a priority every day.

Roger

Mark Your Calendars

"SKILLS FOR LIFE"

August 11
Junior Lifeguards Enviro Day
Santa Clara Recreation Center
7:30am to 7:30pm
(sandiego.gov/lifeguards/junior/)

August 11
Wipeout on ABC Network Television
See Dept Staffer Compete for $50K
8:00pm on Channel 10
(abc.com/wipeout)

August 13 and 14
Fiesta del Sol
Barrio Logan
Cesar Chavez Park
11am to 7pm
(fiestadelsolsandiego.org)

Throughout August
10 am to 11am, Monday thru Friday
Drip Irrigation Mini Clinics
Home Depot - Sports Arena Store
(619-224-9200)

Public Utilities staff are participating in or sponsoring each of these vents.

INSIDE THIS ISSUE:

Customer Care System Now Live!

New Department Billing System to Serve as Foundation for Future Billing Citywide

The Customer Support Division successfully activated the Customer Care Solutions system on July 5, 2011. The Customer Care Solutions (CCS) system will allow customers to have more access to their account information, more and easier ways to pay their bills. Additionally, CCS will allow our Customer Care Agents to better assist customers, as they now have SAP applications that will mirror the information viewed by customers through the online customer portal.

For a historical overview of the project and more recent activities, including customer outreach, please access Customer Care Solutions page at sandiego.gov/publicutilities/ccs.shtml. To access the Customer Care Center, with links to instructional materials and the Public Utilities Customer Portal please access sandiego.gov/customercare/, or click on the "Pay Your Water & Sewer Bill Online" link from the Customer Care Solutions page, or any of the Departments internet sites (e.g., Public Utilities Department, Water Department or Metropolitan Wastewater Department).

Many of our Public Utilities Department Employees are also Public Utilities Customers. You are encouraged to enroll in the new Customer Care Solutions system. Our goal is to get the majority of our customers to an online invoicing and bill payment option, and having you make the switch will greatly help move us towards this target!

Have more questions? Please contact CCS Program Manager Jane Arnold at JArnold@sandiego.gov.

Out with the old...

In with the new...

We're Getting More "Social"

PIO Team Adds to Department Social Media Presence

SD Public Utilities has expanded farther into the social media universe. Now all your news and information about "San Diegans Waste No Water" campaign, the Water Purification Demonstration Project and general happenings around the Department are at your fingertips.

"Like" us on Facebook with the following pages:
City of San Diego Public Utilities
San Diegans Waste No Water
Pure Water SD (Water Purification Demonstration Project)

Follow us on Twitter with the following pages:
@SanDiegansWasteNoWater
@PureWaterSD (Water Purification Demonstration Project)
.

Got it? After you're done with all your "liking" and following, spread the word by tweeting, retweeting and sharing our pages with your friends and family. And if you have no idea what the heck this all means, contact your respective Branch PIOs to get squared away. More social media enhancements coming soon.

Water Purification Debuts

Mayor Holds Press Conference to Announce Opening of Demonstration Project

Deputy Director Marsi Steirer holds up a container of purified water as Mayor Sanders, Councilmember Alvarez and Department Director Roger Bailey look on

On a hot day at the end of June, media outlets from television, radio and print converged onto the North City Water Reclamation Plant (North City WRP) as Mayor Sanders officially unveiled the Advanced Water Purification Facility (AWP Facility) to the public. Also there to support the unveiling was Councilmember David Alvarez and the Public Utilities Department's own Director Roger Bailey and Deputy Director Marsi Steirer.

Under construction since early 2011, the AWP Facility is the focal point of the City's Water Purification Demonstration Project and was well-received by the attending press. *The Voice of San Diego* said the water produced by the AWP Facility looked "alluring" and is "as clean as mankind knows how to get it." Local blogger and San Diego water watchdog George Janczyn of Groksurf.com called the mood around the AWP Facility "celebratory."

The unveiling coincided with the launch of a tour program at the facility. Starting in early June, North City WRP staff and other select guests served as a test audience for dry run tours. The tour program officially launched in July, starting with tours for stakeholders, community leaders, elected officials and water industry experts. Beginning in mid-July the tour program opened up to guests from the general public.

The tour experience educates visitors about the Demonstration Project with a special focus on the AWP Facility's science of purifying recycled water with membrane filtration, reverse osmosis, and UV disinfection with advanced oxidation. Visitors to the facility are greeted in the lobby of the North City WRP, where they are exposed to informational materials and displays about the Demonstration Project. The tour begins with a brief presentation examining San Diego's need for additional water supplies and explaining how water purification could potentially provide San Diego with an independent source of water.

The presentation concludes with a video illustrating just how the technology used at the AWP Facility removes or destroys unwanted materials in the water. Participants then walk through the facility to see the facility equipment up close and view the final product water.

Public Utilities Department staff members are invited to tour the AWP Facility during specially designated City staff open houses. The first of these open house events will take place on September 6. To register, please visit https://apps.sandiego.gov/ereg/purewatersd/courses.php?grp=staff. Supervisor approval is required to attend the tours.

Additional City staff open house tours of the AWP Facility will be available on a regular basis through summer 2012. The Demonstration Project staff is looking forward to City employees learning about water purification during the City staff tours.

Associate Civil Engineer Fabiola Amarillas gives an interview in Spanish for Univision Television

Deputy Director Marsi Steirer provides project details for local television

Project signage enhances the public tour experience

Pipeline Newsletter Article: October 2011

Water Purification Demonstration Project Honored with National Award

Project Director, Marsi Steirer, gleefully accepts award.

The WateReuse Association recognized the Water Purification Demonstration Project for the "2011 WateReuse Public Education Program of the Year Award" at its 26th Annual Symposium in Arizona. Along with examining the use of advanced water purification technology to potentially provide safe and reliable water, the Department has also embarked on a program to educate residents by offering free public tours of the Advanced Water Purification Facility, speaker presentations to interested groups and opportunities to learn about the Demonstration Project at community events throughout San Diego.

Staff members are encouraged to bring family and friends for a tour. To register, visit purewatersd.org, email purewatersd@sandiego.gov or call (619) 533-6638.To better accommodate staff, evening and weekend tours are offered monthly.

San Diego's Fourth Annual Water For People Fall Luncheon

Raising funds for worldwide initiatives

The San Diego Committee of Water For People invites you to its 4th Annual Fall Luncheon on Thursday, October 27th from 11:30AM - 1:00PM at the Admiral Baker Golf Course Club House. The Water For People community will gather to celebrate what has become the most distinguished fundraising event for the organization in the California – Nevada area. All are welcome and encouraged to register online at http://2011wfpluncheon.eventbrite.com.

Water For People (WFP) is a non-governmental organization founded in 1991 by the American Water Works Association. The international, humanitarian organization focuses on improving the quality of life in developing countries by supporting the development of locally sustainable drinking water resources, sanitation facilities and health and hygiene education programs. WFP now works in rural areas of 11 countries where the need is greatest for water and sanitation solutions.

Water Purification Demonstration Project team member, Jennifer Farrow, traveled to Bolivia to assist in the search for clean water.

Pipeline Newsletter Article: January 2012

Fifteen Hundred and Counting!

Catfish Club Member Marks 1,500th Tour Participant at AWP

Members of the Catfish Club take the AWP tour at North City

On December 2, the Water Purification Demonstration Project reached a new milestone when it welcomed its 1,500th tour guest to the Advanced Water Purification (AWP) Facility. Lucky number 1,500 was a member of the Catfish Club, a group that provides a forum on topics critical to the success of diversity in San Diego. Including the Catfish Club's visit, Demonstration Project staff has hosted more than 120 tours since opening in July 2011.

The Demonstration Project continues to examine the use of water purification technology on recycled water to determine the feasibility of a full-scale reservoir augmentation project in San Diego. The tour program has proven to be a successful way to inform the public about the science behind the water purification process.

Guests who participate in the AWP Facility tour gain a better understanding of the Demonstration Project and what role the facility plays in this testing phase. People from all over San Diego have visited and many guests have brought their family, friends and co-workers. Various groups from graduate school classes to the Audubon Society to senior citizen organizations to a fifth grade science class have toured the facility. Elected officials, including San Diego Mayor Sanders and San Diego Councilmembers Alvarez, Faulconer, Gloria, and Lightner, have also been among the visitors. It's not just local folks who visit, though. Because many countries around the globe are interested in water purification technology as a potential solution to water supply issues, international visitors have come all the way from Mexico, Vietnam, Australia and Eurasian countries to see water purification technology in action.

City staff visited the AWP Facility during specially designated tours in the fall. Additional City staff tours will be posted as they become available at https://apps.sandiego.gov/ereg/purewatersd/courses.php?grp=staff. For those that have already toured, please encourage friends and family to join a public tour by registering online at www.purewatersd.org/tours.shtml or request a presentation for your organization by emailing purewatersd@sandiego.gov or calling (619)533-6638.

B2G Update

Auditor Expected on Board in February

The Department is completing several steps in the annual Bid to Goal (B2G) program cycle. Currently, the Department is in the process of selecting an auditor who will review the FY10 B2G goal attainment results, savings calculations, Employee Efficiency Incentive Reserve (EEIR)/Assurance fund activity, and employee eligibility. We anticipate an auditor will be on board in February 2012. After the audit is complete, the Department should be able to begin to process payments. Keep checking the Pipeline for the latest B2G information. If you have any questions, contact Liz Barat at ebarat@sandiego.gov or 858-292-6474.

SURVEY

Continued from page 1

them as a tool to identify areas where employees feel we are doing well, as well as identify areas where employees feel we could improve. Next, in spring of 2012, a Peer Review Team comprised of executives from Water and Wastewater utilities around the country will use our Self-Assessment report as a starting point for an in-depth review and benchmarking of our utility.

Detailed information on the QualServe program can be found at the following site: http://www.awwa.org/Resources/utilitymanage.cfm?ItemNumber=624&navItemNumber=3769

If you have any other questions, contact Liz Barat at ebarat@sandiego.gov or 858-292-6474.

WPDP Video Debuts

Virtual Tour of Advanced Water Purification Facility Featured

Department PIO staff worked with CityTV to create a new video featuring Deputy Director Marsi Steirer as host and narrator of a virtual tour of the Advanced Water Purification Facility at the North City Water Reclamation Plant.

The video was developed to increase awareness of the Water Purification Demonstration Project, serve as an alternative for those unable to take the actual tour and serve as a catalyst to increase public participation in the project. The video is available on the project page at purewatersd.org (on our website) and is also available on YouTube (search for PureWaterSD).

"Winning..."

California Water Environment Association Honors Department

From left to right: Denis Pollak CWEA, Stan Griffith Deputy Director, Wastewater Collection Division, Ann Sasaki Assistant Director, Public Utilities Department, Rick Lewis, Bev Stumman, Duane Johnson of CWEA and Michael Rosenberg Principal Water Utility Supervisor, Wastewater Collection Division

On December 15, the Wastewater Collections Division was bestowed two awards from the California Water Environment Association. One award was for hosting a collection system workshop with the Southern Section Collection Systems Committee of the association, in which 15 cities participated. The second award was given to Deputy Director Stan Griffith for his support and leadership in the wastewater collection field.

From the Editor's Desk:

Pipeline is the monthly internal newsletter of the City of San Diego's Public Utilities Department. The aim of ***Pipeline*** is to keep employees up-to-date on the people, places and events in our Department. ***Pipeline*** is distributed to Department staff and others in the City interested in Public Utilities news. The newsletter is produced on a rotation basis by the Department's Public Information Officers.

January Editor: Eric Symons

January Contributors: Roger Bailey, Liz Barat, Arian Collins, Brian Drummy, Laura Durbin, Kurt Kidman, Terrell Powell, Alma Rife, Michael Rosenberg and Danielle Thorsen.

February Editor: Arian Collins

If you have any story ideas and photos for the **February issue of *Pipeline***, contact Arian Collins in the Public Information at (619) 527-3121 or email him. **Please provide content by 1/23/12 (the sooner the better)**.

What to Contribute for Future Issues? We're looking for constructive questions for the Director (which will remain anonymous), photos of the month that relate to the department, staff news, section, division, or department events, spotlights on operations, customer recognition, upcoming partner events, Department fundraisers, interesting factoids and statistics about operations, etc. **This is your staff newsletter so all of your contributions and suggestions are greatly appreciated!**

Our Mission:

To ensure the quality, reliability, and sustainability of water, wastewater and recycled water services for the benefit of the ratepayers and citizens served.

Our Vision:

We are an industry leader in the delivery of water, wastewater and recycled water services

Our Guiding Principles:

Service Excellence

Environmental Stewardship

Fiscal Responsibility

Continuous Improvement

Innovative Use of Technology

Sustainable Growth and Prosperity

Safe Work Environment

Dedicated to Employee Development

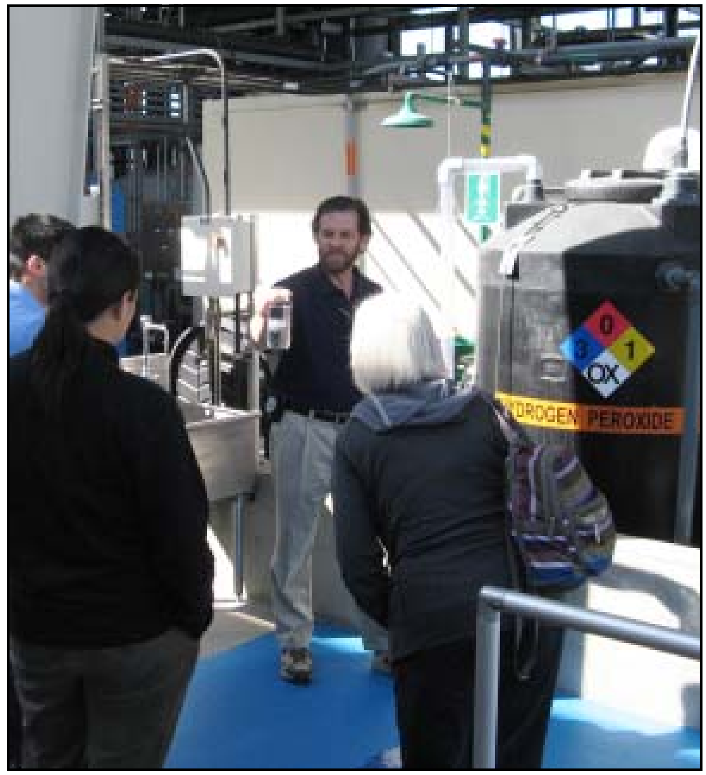
Pipeline Newsletter Article: February 2012

AWP Facility Tour Program Gaining Momentum

Nearly 200 people have already toured the Advanced Water Purification Facility in 2012. The tour educates visitors about the Demonstration Project with a special focus on the AWP Facility's science of purifying recycled water with membrane filtration, reverse osmosis, and UV disinfection with advanced oxidation. Some of the groups to visit the AWP Facility in January included the Conservation Action Committee, Santa Clara Valley Water District, San Diego Community College Older Adults Program, the Army Reserves, and UCSD School of Medicine. On Jan. 13, Councilmember Marti Emerald, her staff, and a representative from State Assemblymember Marty Block's office also visited the AWP Facility.

The tours continue to garner positive feedback from attendees. The *San Diego Union-Tribune* covered the tours in the Jan. 22 article "Water purification tour tries to make process crystal clear." A tour guest responded with a letter to the editor stating, "I toured the Advanced Water Purification Facility ... and was impressed with the overall operation and results that I saw… [T]here is no danger or need for 'queasy stomachs' regarding the introduction of purified water into the San Diego water supply."

A UCSD School of Medicine professor who toured with her students on Jan. 18 said, "The students were very interactive, raising many questions and issues. I have found this type of student response is an excellent indicator of the value of the experience. Hopefully the tours and the knowledge that the students acquired will assist them in both their personal lives and in the guidance they provide their patients regarding the important decisions we all will be making in terms of the community's use and reuse of our limited water resources."



UCSD medical students tour the Advanced Water Purification Facility.

Department Staff Can Take Tour March 20

Public Utilities Department staff members are invited to tour the AWP Facility during tours specifically designed for City staff on March 20. To register, please visit https://apps.sandiego.gov/ereg/purewatersd/courses.php?grp=staff. Supervisor approval is required to attend the tours. City employees are asked to not register for the general public tours in order to conserve space on those tours for community members. For those that have already toured, please encourage friends and family to join a public tour by registering online at www.purewatersd.org/tours.shtml or request a presentation for your organization by emailing purewatersd@sandiego.gov or calling 619-533-6638.

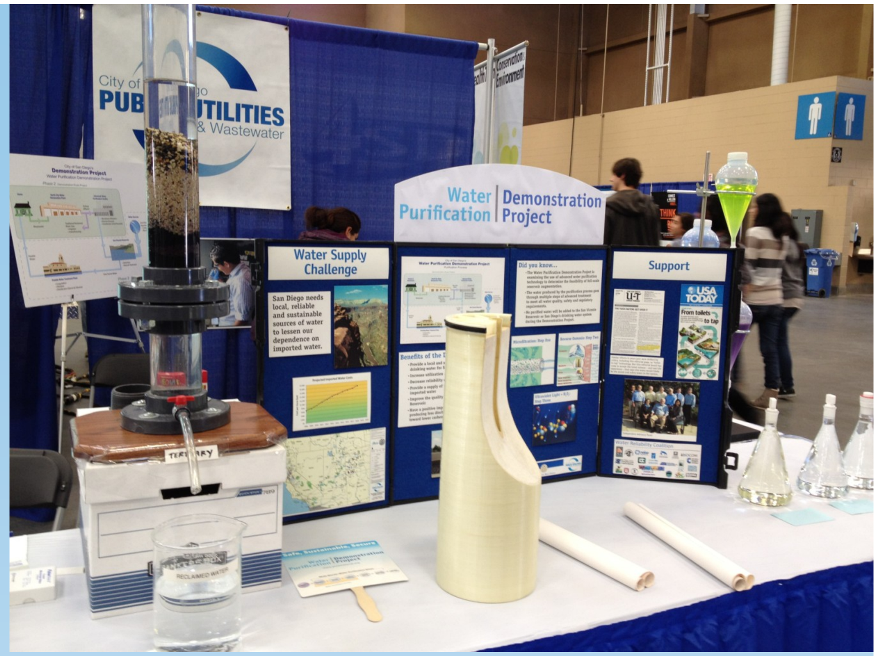
The Demonstration Project will also be featured at the Public Utilities Department's exhibit at the San Diego Science Alliance High Tech Fair on Feb. 7 and 8 from 5 to 8 p.m. in Wyland Hall at Del Mar Fairgrounds. City staff interested in attending the High Tech Fair can learn more and register online at http://sdsa.org/programs/high-tech-fair/programs/high-tech-fair/programs/high-tech-fair/high-tech-fair.

AWWA QualServe Self-Assessment Survey: Wrap-up and Next Steps

A big thank you to all employees who participated in the American Water Works Association (AWWA) QualServe Self-Assessment Survey. Your opinion on how our utility performs in various aspects of our industry is valued and appreciated. This month, the survey results will be aggregated into a final report for our Department by AWWA. Our Executive Team will be reviewing the results and using them as a source of data to identify areas where employees feel we are doing well, as well as identify areas where employees feel we could improve. This spring, a Peer Review Team comprised of executives from Water and Wastewater utilities around the country will use our Self-Assessment report as a starting point for an in-depth peer review and benchmarking of our utility. Detailed information on the QualServe program can be found at the following site: www.awwa.org/Resources/utilitymanage.cfm?ItemNumber=624&navItemNumber=3769. If you have any other questions about the Self-Assessment, contact Liz Barat at ebarat@sandiego.gov or 858-292-6474.

Pipeline Newsletter Article: March 2012

Making a Difference



On February 7th and 8th members of the Environmental Monitoring and Technical Services Division (EMTS) participated for the fourth consecutive year in the San Diego Science Alliance High Tech Fair. The goal of the fair is to enlighten 7th-12th grade students to the world of science and the possibilities of a scientific career.

The EMTS exhibit featured a demonstration of the recycled water treatment process with discussion of the beneficial reuses of recycled water, and included a real-time view of the role of microorganisms in the wastewater treatment process. The exhibit showcased the City of San Diego's Water Purification Demonstration Project, which is examining the use of advanced water purification technology to provide safe and reliable water for San Diego's future. The exhibit allows students to explore and enjoy seeing 'real life' applications of what they may be learning in the classroom.

Fair attendees were intrigued by the microorganisms found in the activated sludge treatment process, especially the hard-to-find but amazing, Water Bear. Upon completion of the ten minute presentation, students, parents, and teachers alike expressed support of the Water Purification Demonstration Project's ability to produce high-quality drinking water. Their toilet-to-tap concerns had floated away!

The High Tech Fair is a collaborative effort between the Science Alliance, the San Diego County Office of Education and San Diego City Schools. It includes over 50 exhibitors from local cutting-edge STEM organizations and nearly 3000 students in attendance. EMTS staff members, Victoria Santibanez, Alejandra Molloy, Erica Fitzgerald, Eric Clark, Greg Schlimme, and Doug Campbell, prepared and hosted the exhibit.

Partnership for Safe Water Directors' Award

Otay operations staff modeling award shirts. From left: Julieanna Piatek, Cory Boyd, Tom Watson, Jeff Cekander, Glenda Evans, Brandon Krumenacker, Julio Gonzalez, Israel Jazo, Jim McVeigh, Jesus Meda, Jamie Garcia, Jim Fisher, Roger Bailey, Ephraim Delarosa, Jonathan McDowell and Gabe Soltero.

The Otay Water Treatment Plant recently earned its fourth consecutive Partnership for Safe Water Directors' Award. The award program is a nationally recognized effort sponsored by the country's leading drinking water agencies, including the Environmental Protection Agency and the American Water Works Association. The Partnership is a voluntary program in which a water treatment plant strives to provide the safest water possible – not just meet the standards. This award recognizes Otay staff for its hard work and accomplishment in water treatment plant optimization.

PIPELINE

PUBLIC UTILITIES MONTHLY UPDATE

From the Editor's Desk:

Pipeline is the monthly internal newsletter of the City of San Diego's Public Utilities Department. The aim of ***Pipeline*** is to keep employees up-to-date on the people, places and events in our Department. ***Pipeline*** is distributed to Department staff and others in the City interested in Public Utilities news. The newsletter is produced on a rotation basis by the Department's Public Information Officers.

March Editor: Alma Rife
March Contributors: Liz Barat, Melissa Oates, Alma Rife, Doug Campbell, Arian Collins.
April Editor: Eric Symons

If you have any story ideas or photos for the **April issue**, contact **Eric Symons** at (619) 980-2784 or email him at esymons@sandiego.gov. **Please provide content by 3/22/12.**

What to Contribute for Future Issues? We're looking for constructive questions for the Director (which will remain anonymous), photos of the month that relate to the department, staff news, section, division, or department events, spotlights on operations, customer recognition, upcoming partner events, Department fundraisers, interesting factoids and statistics about operations, etc. **This is your staff newsletter so all of your contributions and suggestions are greatly appreciated!**

Our Mission:

To ensure the quality, reliability, and sustainability of water, wastewater and recycled water services for the benefit of the ratepayers and citizens served.

Our Vision:

We are an industry leader in the delivery of water, wastewater and recycled water services

Our Guiding Principles:

Service Excellence
Environmental Stewardship
Fiscal Responsibility
Continuous Improvement
Innovative Use of Technology
Sustainable Growth and Prosperity
Safe Work Environment
Dedicated to Employee Development

Pipeline Newsletter Article: April 2012

Tweeting, Posting and Uploading, Oh My!

Department Expands Social Media Presence with YouTube and Twitter

The External Affairs section is continuing to expand our social media presence with the development of a new Department YouTube channel and Twitter account. Through the YouTube channel, which can be searched as SDPublicUtilities, the Public Information staff will be showcasing a series of videos that will focus on Department operations, services and programs. In addition, the channel currently features videos from partner organizations that relate to our services.

The new Twitter account, @SDPubUtilities, is a must to follow for interesting news and tidbits about all things Public Utilities.

Combined, the Department now has three Facebook pages (become a "fan" of City of San Diego Public Utilities, San Diegans Waste No Water and Water Purification Demonstration Project), three Twitter accounts (same subjects) and two YouTube Channels (SDPubUtilities and Purewatersd).

Check out the new YouTube Channel (from home of course) and follow us on Twitter. While External Affairs staff are constantly monitoring for items to tweet, post, and upload, please share your ideas as well. Simply contact a Department PIO if you have suggestions for content.

We can even post or retweet information and resources from our many partner organizations, so forward content, links, photos, video ideas, etc to a PIO in External Affairs.

SDPublicUtilities is the address for the Department's new YouTube channel

@SDPubUtilities is the address for the Department's Twitter account

Busy, Busy Bee!

Testifying Before the State Assembly, Giving Tours and Winning Awards Keeps This DD on the Move

Department Deputy Director Marsi Steirer testified at the March 20 California State Assembly Water, Parks and Wildlife Committee's informational and oversight hearing on Untapped Potential: Water Reuse for California's Future Water Supply Reliability. As one of only three California case studies presented at this hearing, the Committee is recognizing San Diego's leadership promoting potable reuse.

This hearing could lay policy groundwork in support of streamlined permitting of future purified water projects, offering communities across California additional local water supply options.

Deputy Director Marsi Steirer gives Councilmember Todd Gloria and members of his staff a tour of the Advanced Water Purification Facility (one of 42 tours Marsi has given so far).

California WateReuse Association President Paul Jones stands with Deputy Director Marsi Steirer, who was awarded the WateReuse Advocate of the Year at the association's annual conference in Sacramento.

According to the nomination, Marsi "...has been a tireless champion of potable reuse as a valuable local water supply option and has managed to keep the concept alive at city hall despite facing many challenges.

In 2004, Steirer managed the Water Reuse Study, which picked up the pieces from the previous unsuccessful attempt to be the first city in California to augment a surface water reservoir with highly treated recycled water. She managed the successful stakeholder process that resulted in a recommendation that the City move forward with reservoir augmentation.

Undaunted by the political 'buzzsaw' she encountered when the final report was released, Steirer worked with City Council members and a broad-based coalition of environmental, business, taxpayer advocacy and technology groups to bring it forth from the life-support phase to a 1 million-gallon-a-day demonstration project.

Steirer is also at the helm of a comprehensive public outreach program and a series of technical studies for the project."

Congrats Marsi!

Pipeline Newsletter Article: November 2012

Department wins AMWA 2012 Achievement Award

On October 22nd, San Diego Public Utilities won the Platinum Award for Utility Excellence from The Association of Metropolitan Water Agencies (AMWA) at its 2012 annual meeting in Portland, Oregon. Director Roger Bailey accepted the award on behalf of the Department.

Director Roger Bailey accepting the Department's Achievement Award from AMWA President Pat Mulroy

"I was proud to accept this award on behalf of all the employees of San Diego Public Utilities who work hard each and every day to ensure that we are the very best at what we do and are an industry leader. We are truly 'excellent'. "

San Diego Public Utilities was one of ten national winners—and the only agency in California—to receive the Platinum Award for Utility Excellence while four others won the Gold Award for Exceptional Utility Performance.

"AMWA's 2012 award winners are industry-leading water systems with innovative managers and dedicated workforces who create sustainable utilities marked by high quality, affordable water, responsive customer service and attention to resource management and environmental protection," said AMWA President Pat Mulroy, General Manager, Las Vegas Valley Water District. "The accomplishments of these exceptionally well-run public utilities should be a source of pride for the communities they serve."

The Attributes of Effective Utility Management are industry standards and cover utility performance in areas of product quality, customer satisfaction, employee and leadership development, operational optimization, financial viability, infrastructure stability, operational resiliency, community sustainability, water resource adequacy, and stakeholder understanding and support.

AMWA recognized that the Department prides itself in continual improvement and has established goals, objectives and initiatives that challenge employees to be optimally efficient. During FY2010 and FY2011 additional initiatives regarding Bond Refinancing and State Revolving Fund loans have generated savings of $107.8M over 30 years.

Through award winning projects, like the Water Purification Demonstration Project, the Department pursues innovative ways of creating new local water supplies to address the increasing demands and needs of the public. Revenue producing initiatives that help alleviate the rates of the citizens are continuously explored, such as the Beneficial Use of Digester Gas Project which has led to the production of a renewable energy source.

"AMWA's 2012 award winners are industry -leading water systems with innovative managers and dedicated workforces . . . The accomplishments of these exceptionally well-run public utilities should be a source of pride for the communities they serve."

—Pat Mulroy, AMWA President

These efforts illustrate the Department's commitment to providing the standard of excellence on which the residents of San Diego depend.

Pipeline Newsletter Article: December 2012

Last call for Staff to Tour AWP Facility

Public Utilities Department staff members are invited to tour the Advanced Water Purification (AWP) Facility on Thursday, Dec. 13 at 10 a.m., 11 a.m. or 1 p.m. More than 3,000 people have toured the AWP Facility since opening in June 2011. The tour experience educates visitors about the Demonstration Project with a special focus on the AWP Facility's science of purifying recycled water using membrane filtration, reverse osmosis, and UV disinfection with advanced oxidation. The purpose of the Demonstration Project is to determine whether purifying recycled water and adding it to the San Vicente Reservoir is a viable option for supplementing San Diego's local water supplies.

Long-Range Planning & Water Resources engineer Bill Pearce, left, conducts a tour of the AWP facility.

The Demonstration Project team is currently preparing a final report on the project's findings. The team has conducted a variety of activities, including constructing and operating a one-million-gallon-per-day AWP Facility, studying the potential effects of adding purified water to the San Vicente Reservoir, conducting a pipeline alignment assessment, determining economic and energy needs, developing regulatory requirements, and educating the public about the water purification process. Findings from the project components will be compiled in a final report, which will be available to the public in early 2013.

As the project winds down, this may be one of the last opportunities for staff to tour the facility. To reserve your spot, please visit https://apps.sandiego.gov/ereg/purewatersd/courses.php?grp=staff. **Registration closes on Dec. 7.** Supervisor approval is required to attend the tours. City employees are asked to not register for the general public tours in order to conserve space on those tours for community members. For those that have already toured, please encourage friends and family to join a public tour by registering online at www.purewatersd.org/tours.shtml or request a presentation for your organization by emailing purewatersd@sandiego.gov or calling (619)533-6638.

Appendix I: City Council Resolution

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ITEM 33
4/23/13

(R-2013-511 Rev. Copy)

RESOLUTION NUMBER R-308121

DATE OF FINAL PASSAGE MAY 2 2013

A RESOLUTION OF THE COUNCIL OF THE CITY OF SAN DIEGO ADOPTING THE WATER PURIFICATION DEMONSTRATION PROJECT DRAFT PROJECT REPORT AS A FULFILLMENT OF THE DEMONSTRATION PROJECT ELEMENTS OUTLINED IN RESOLUTIONS R-303095 AND R-304434.

WHEREAS, in January 2004, the City Council of the City of San Diego approved a study to evaluate options to increase the use of recycled water produced at the City's two water reclamation plants; and

WHEREAS, the Water Reuse Study identified Reservoir Augmentation of the City's San Vicente Reservoir as the preferred reuse strategy; and

WHEREAS, in October and December 2007, the Council voted through Resolution R-303095 to accept the Water Reuse Study and proceed with the Indirect Potable Reuse/Reservoir Augmentation Demonstration Project [Demonstration Project] to evaluate the concept's feasibility; and

WHEREAS, a temporary water rate increase to fund the Demonstration Project was approved by the Council on November 25, 2008 through Resolution R-304434, and was in effect from January 1, 2009 to September 1, 2010; and

WHEREAS, this action is to adopt the Water Purification Demonstration Project, Project Report on file in the office of the City Clerk as Document Number RR 308121 in fulfillment of the elements outlined in City Council actions approved in 2007 and 2008; NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of San Diego, that the Water Purification Demonstration Project Report is accepted as a fulfillment of the Demonstration Project elements outlined in Resolutions R-303095 and R-304434;

BE IT FURTHER RESOLVED, that staff is directed to have the City join the Direct Potable Reuse Initiative.

APPROVED: JAN I. GOLDSMITH, City Attorney

By ______________________
Raymond C. Palmucci
Deputy City Attorney

RCP:amt:cla
04/24/2013 **(Rev. Copy)**
Or.Dept:PUD
Doc. No. 529049_4

I hereby certify that the foregoing Resolution was passed by the Council of the City of San Diego, at this meeting of APR 23 2013.

ELIZABETH S. MALAND
City Clerk

By ______________________
Deputy City Clerk

Approved: 5/2/13
(date)

____
BOB FILNER, Mayor

Vetoed: ______________________
(date)

____
BOB FILNER, Mayor

Passed by the Council of The City of San Diego on APR 23 2013, by the following vote:

Councilmembers	Yeas	Nays	Not Present	Recused
Sherri Lightner	☑	☐	☐	☐
Kevin Faulconer	☑	☐	☐	☐
Todd Gloria	☑	☐	☐	☐
District 4 (Vacant)	☐	☐	☐	☐
Mark Kersey	☑	☐	☐	☐
Lorie Zapf	☑	☐	☐	☐
Scott Sherman	☑	☐	☐	☐
David Alvarez	☑	☐	☐	☐
Marti Emerald	☑	☐	☐	☐

Date of final passage MAY 2 2013.

AUTHENTICATED BY:

BOB FILNER
Mayor of The City of San Diego, California.

(Seal)

ELIZABETH S. MALAND
City Clerk of The City of San Diego, California.

By ______________________________, Deputy

Office of the City Clerk, San Diego, California

Resolution Number R-308121