August 7, 2013

San Diego Integrated Regional Water Management Program

Regional Advisory Committee

Water Purification Demonstration Project Results

Jeffery Pasek

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

WATER PURIFICATION DEMONSTRATION PROJECT

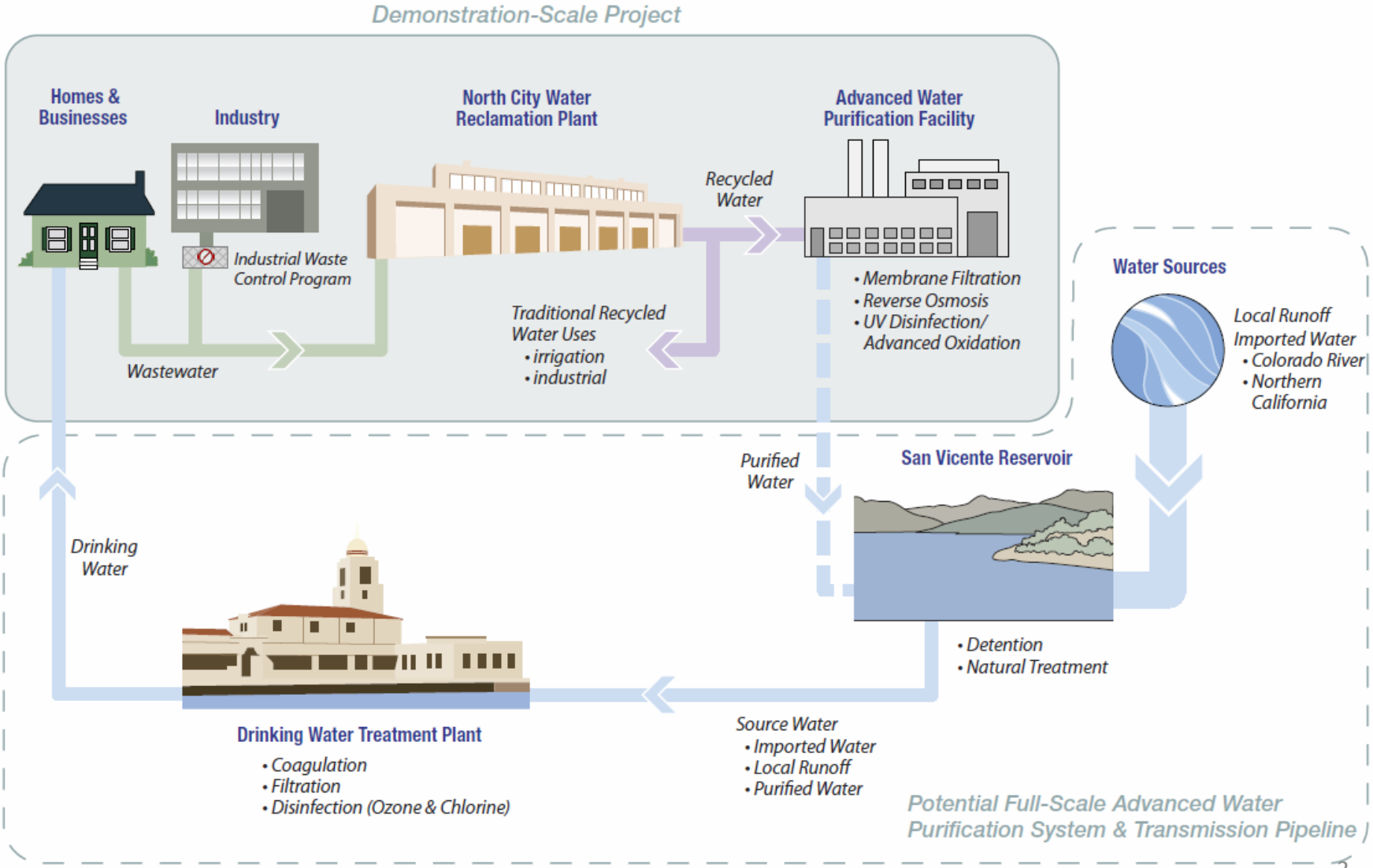
COMPONENTS

- Advanced Water Purification (AWP) Facility
- Independent Advisory Panel (IAP)
- San Vicente Reservoir Study
- Regulatory requirements
- Energy and cost analysis
- Education and outreach program

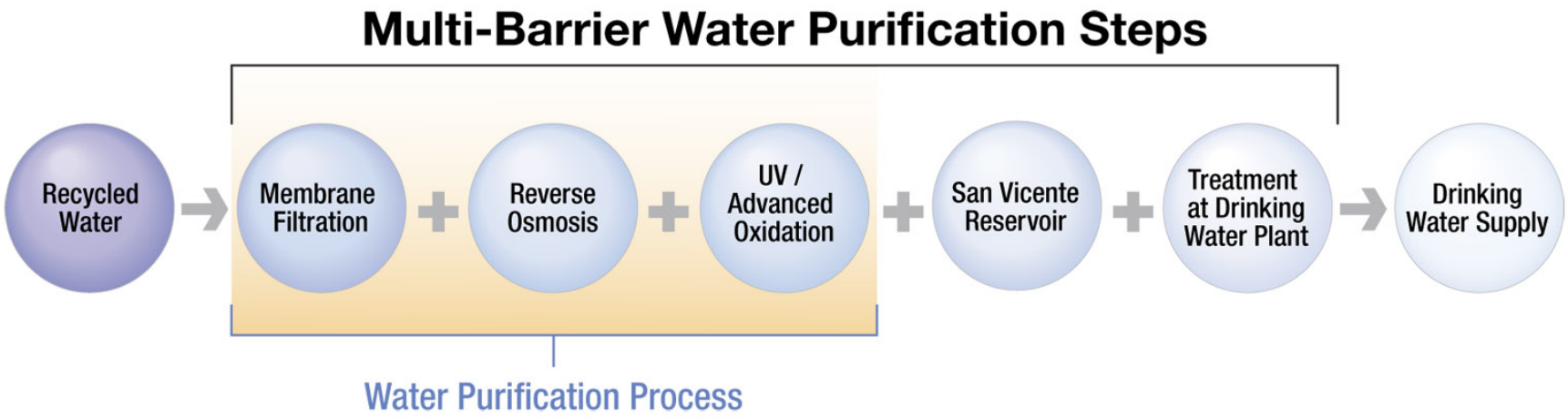
City of San Diego's

Water Purification Demonstration Project

Purification Process



Water Purification Process



Microfiltration & Ultrafiltration

Reverse Osmosis

Ultraviolet Light / Hydrogen Peroxide

AWP Facility Testing & Monitoring Plan

- Testing period August 1, 2011 to July 31, 2012
- Measured for 342 constituents and parameters in recycled water, purified water, and imported water
- Conducted 9,000 individual water quality laboratory tests
- Implemented continuous and daily monitoring before and after each treatment step to verify integrity of each treatment process

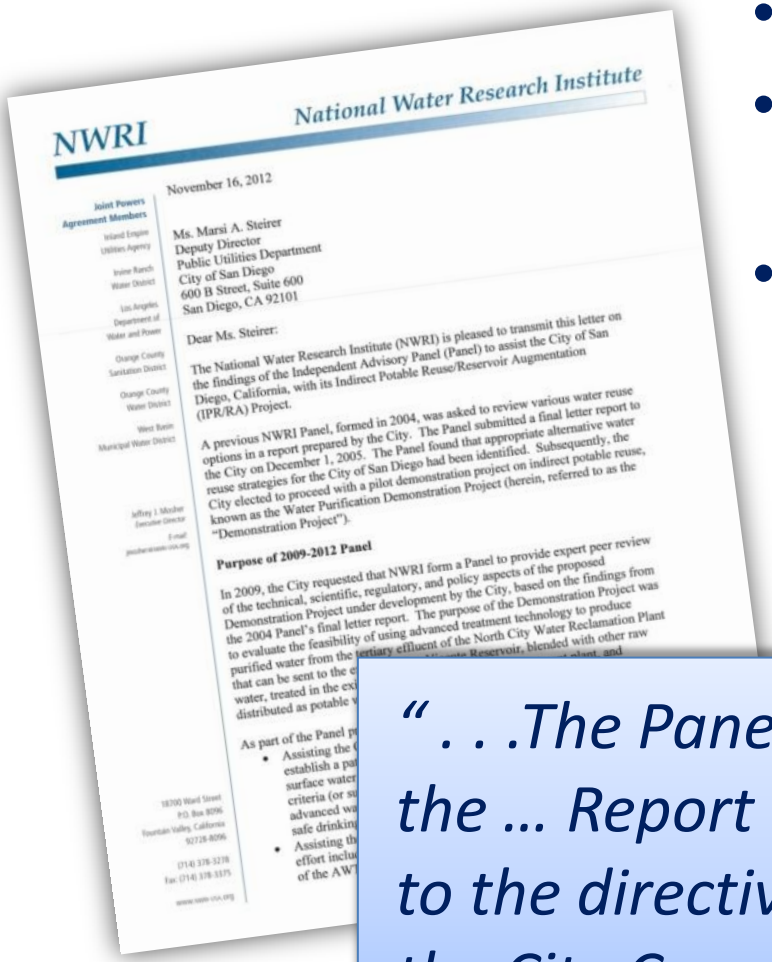
AWP Facility Testing & Monitoring Results

- Purified water met all federal and state drinking water standards
- Overall water quality was exceptional, comparable to distilled water
- Lab tests plus continuous monitoring ensured only high quality water was produced
- Continuous and daily monitoring verified the integrity of the treatment process and equipment

Independent Advisory Panel

- Convened to provide expert peer review of the technical, scientific, and regulatory aspects of the Demonstration Project
- Requested by California Department of Public Health (CDPH)
- Provided feedback regarding
  - San Vicente Reservoir
  - AWP Facility
  - Proposed regulatory framework

INDEPENDENT ADVISORY PANEL CONCLUSIONS



NWRI National Water Research Institute

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 [illegible] Reservoir, blended with other raw water, treated in the ex[illegible] plant, and distributed as potable w[illegible]

As part of the Panel p[illegible]
- Assisting the [illegible] establish a pa[illegible] surface water[illegible] criteria (or su[illegible] advanced wa[illegible] safe drinkin[illegible]
- Assisting th[illegible] effort inclu[illegible] of the AWT[illegible]

- Ten IAP meetings over three years
- IAP issued summary "letter of findings" November 16, 2012
- Unanimously concluded that the San Vicente Reservoir augmentation project would be a landmark development for indirect potable reuse and would contribute to San Diego's water portfolio

" . . .The Panel believes that the … Report … (is) responsive to the directives set forth by the City Council."

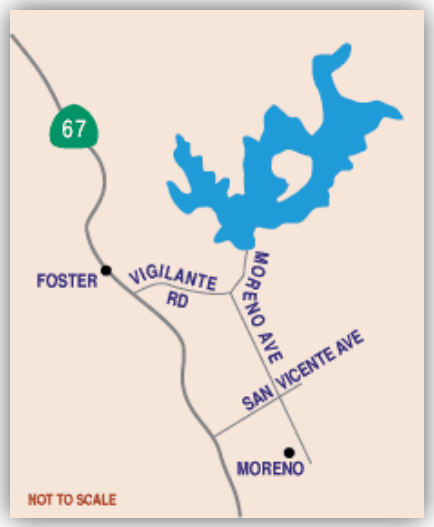
San Vicente Reservoir Study

- Determine water quality effects of purified water in the reservoir
- Establish the retention time and dilution of purified water in the reservoir

- Secure regulatory approval from CDPH and San Diego Regional Water Quality Control Board

San Vicente Reservoir Study Results

- Reservoir provides an environmental barrier that satisfies anticipated regulatory requirements
- Purified water will be diluted at least 200:1 under all anticipated reservoir operations
- Water quality in San Vicente will not be affected by adding purified water



Regulatory Framework

- Regulatory agencies, CDPH, Regional Water Board, and County Dept of Environmental Health, attended IAP meetings
- Regulators commented on:
  - AWP Facility equipment
  - Testing & Monitoring Plan
  - San Vicente Reservoir Study

Regulatory Framework Results

- California Department of Public Health (CDPH) concept approval letter 9/7/2012

> *"Based on CDPH's review of the City's … submittal … CDPH approves the San Vicente Reservoir Augmentation Concept."*

- City received a letter of concurrence from the Regional Water Board on 2/12/2013

> *"The . . . Water Board, with concurrence from USEPA, strongly supports the efforts of the City to develop the San Vicente Reservoir Augmentation Project…"*

Energy & Cost Analysis

Energy:

- Energy consumption and greenhouse gas emissions of purified water delivered to San Vicente comparable to that of imported water

Cost:

- $2,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir

Public Outreach & Education Program

Program Statistics to date:

- Speakers Bureau presentations/attendees 159/4,138
- Community events/attendees 58/7,500
- Facility tours/visitors 270/3,610

PUBLIC OUTREACH & EDUCATION

The San Diego Voice & Viewpoint

"A People Without a Voice Cannot be Heard"

JULY 18, 2013

Speeding Towards Water Purification in San Diego

by writer01

Uncategorised | No Comments

SAN DIEGO – Earlier this year, the City of San Diego concluded that recycled water could be purified and safely used as a new source of water for San Diego. In the spirit of Comic-Con, the City of San Diego is spreading the word about the super technology that produces purified water. Trolley advertisements around the City currently highlight not only the technology, but also how everyone – including superheroes – needs water.

Water is essential to keep San Diego thriving. Yet San Diego has very little local rainfall and must rely on importing approximately 85 percent of its water from Northern California and the Colorado River. With the risk of earthquakes, droughts, continued pumping restrictions and rising costs of imported water impacting the reliability of this imported supply, the need for a local water source has become more urgent. As thousands of comic b

Comic-C

KPBS Listen Schedules Programs Blogs Give

News Arts & Culture Family Living Events

Final Report Says Recycling Water Is Not So Expensive

Wednesday, March 20, 2013

By Tom Fudge

SAN DIEGO — The San Diego Public Utilities Department today presents its final report on water recycling and estimates it would cost no more to recycle water than to import it.

KPBS Radio News

00:00 / 00:00

Final Report Says Recycling Water Is Not So Expensive

Aired 3/20/13

The San Diego water department today presents its final report on water recycling and estimates it would cost no more to recycle water than to import it.

The report will be presented the San Diego City Council's Natural Resources and Culture Committee.

Turning wastewater into drinking water could provide a large, reliable source of water for San Diego. But water recycling has been politically controversial because some people think reusing wastewater is distasteful.

It's also been seen as expensive: about twice the cost of importing water from outside the region.

But the final report on San Diego's Water Purification Demonstration Project now claims the future cost of recycled and imported water would be about the same, around $1,000 per acre foot.

The report indicates recycling water does save some money by reducing the need for imported water and by cutting the volume of water the city must handle

Tide turns for water purification plan

U-T San Diego

By Deborah Sullivan Brennan 6 A.M. APRIL 22, 2013

The New York Times

SundayReview | The Opinion Pages

'Taking the Waste Out of Wastewater'

SCOOP SAN DIEGO

San Diego City Council Approves Water Purification

- Water Reliability Coalition says new safe, reliable drinking water could supply up to 40 percent of City of San Diego's demand

USA TODAY

NO. 1 IN THE USA • USATODAY.COM

COVER STORY

From toilets to tap

As water becomes more precious, more drinking water will come from treated sewage. Here's how it works.

The New York Times

FRIDAY, FEBRUARY 10, 2012

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

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

FOX5 SAN DIEGO

LOCAL NEWS

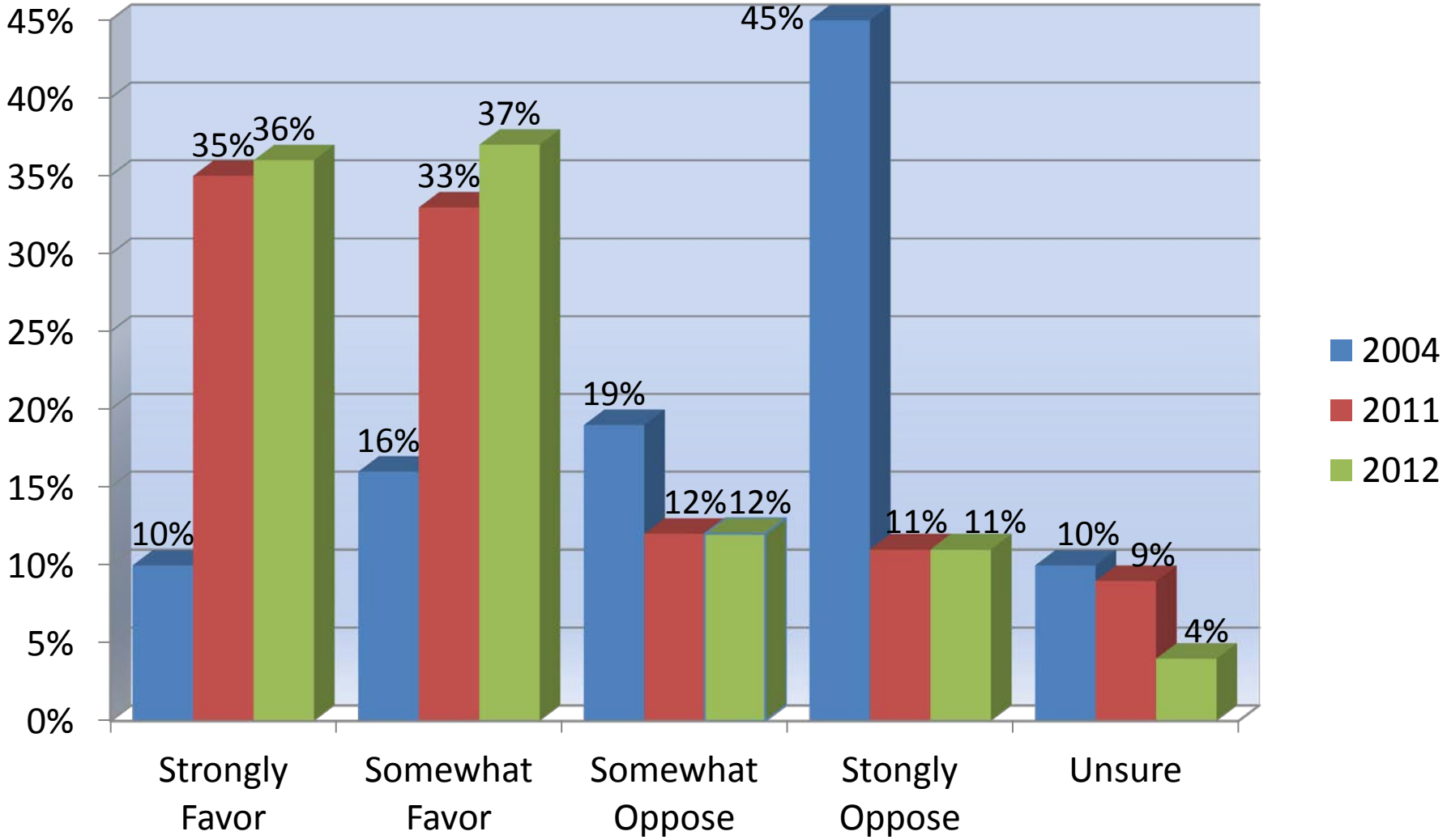
San Diego studies making drinking water from waste water

abc 10 NEWS

Purification system that makes toilet water clean enough to drink is closer to coming to San Diego

Public Outreach & Education Program
Research Results

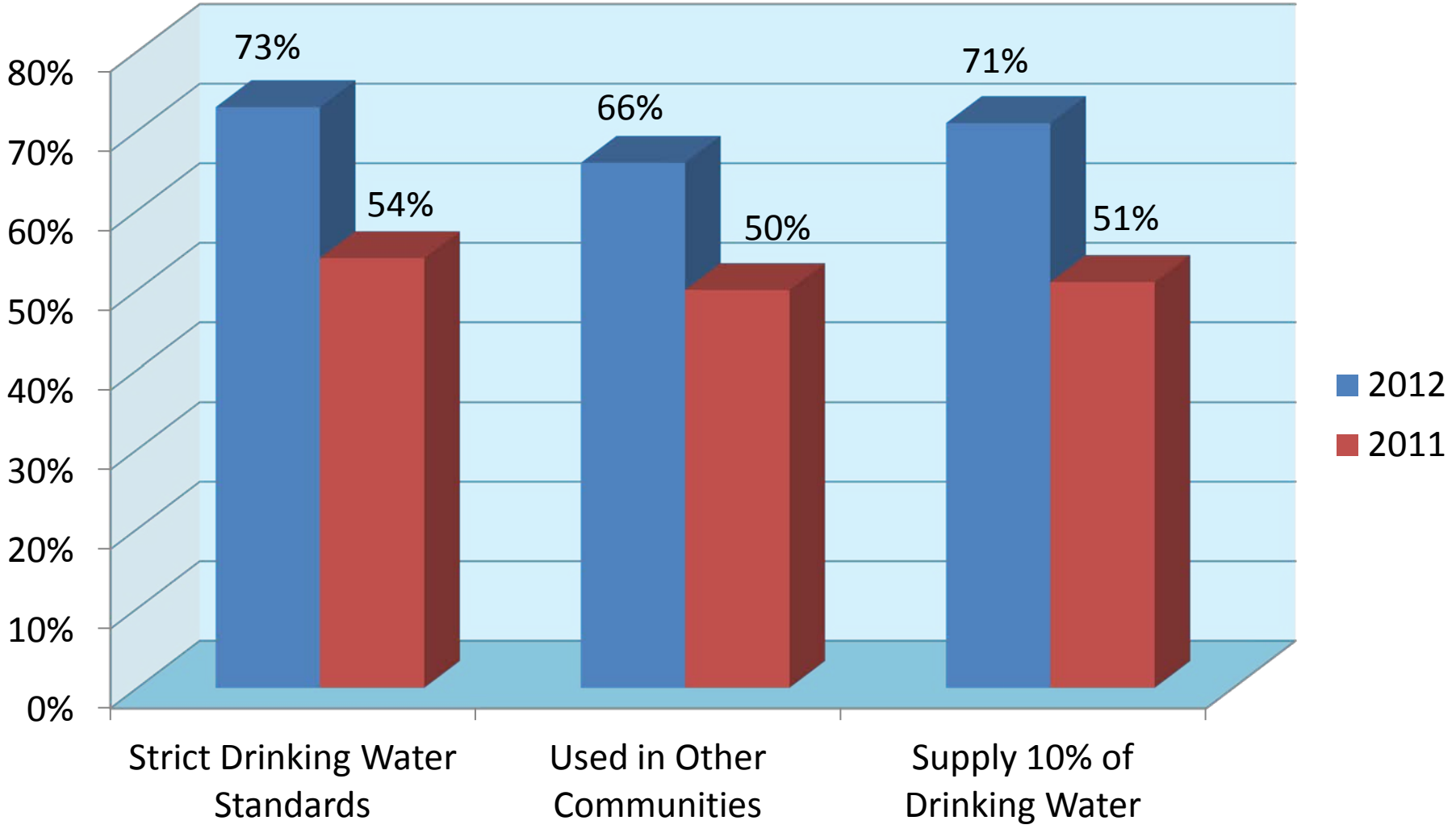
Use Advanced Treated Recycled Water as an Addition to Drinking Water Supply

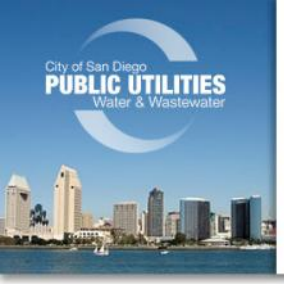


Public Outreach & Education Program

Research Results

Accepting of Recycled Water to Supplement Drinking Water if Respondent Learned certain facts





WRC
WATER RELIABILITY COALITION

- 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
- Equinox Center
- 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 Business Leadership Alliance
- 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

SUMMARY

ADVANCED WATER PURIFICATION FACILITY

Operated 12 months; produced water that met all state and federal standards

SAN VICENTE RESERVOIR STUDY

Satisfied all anticipated regulatory requirements

REGULATORY FRAMEWORK

Received conceptual approval for a full-scale project from CDPH & Regional Water Board

ENERGY & COST ANALYSIS

Determined energy use is comparable to imported water and costs $2,000 per AF

EDUCATION & OUTREACH

Increased understanding and approval of water purification

PROJECT REPORT

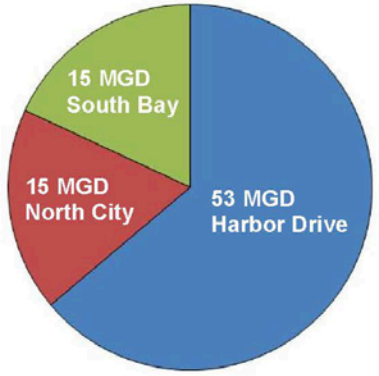
Adopted by City Council in April 2013

Road Map to Implementation

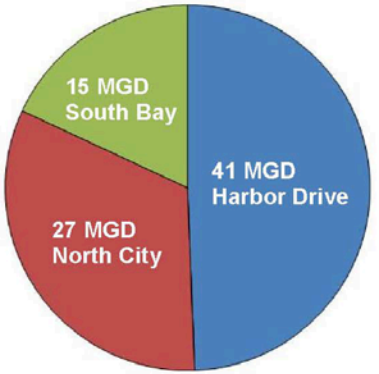
1. Determine a preferred implementation plan and schedule that considers potable reuse options for maximizing local water supply and reducing flows to the Point Loma Wastewater Treatment Plant.
2. Continue outreach efforts
3. Develop a strategy for allocating potable reuse costs among local water and wastewater funding sources
4. Develop a financing plan
5. Monitor the development of direct potable reuse regulations
6. Join the Direct Potable Reuse Initiative led by the WateReuse Research Foundation
7. Coordinate potable reuse implementation strategy with Point Loma 2015 Permit Renewal Application
8. Continue AWPF operations

Potable Reuse Facility Alternatives

POTABLE REUSE FACILITY ALTERNATIVES



2035 Potable Reuse Potential

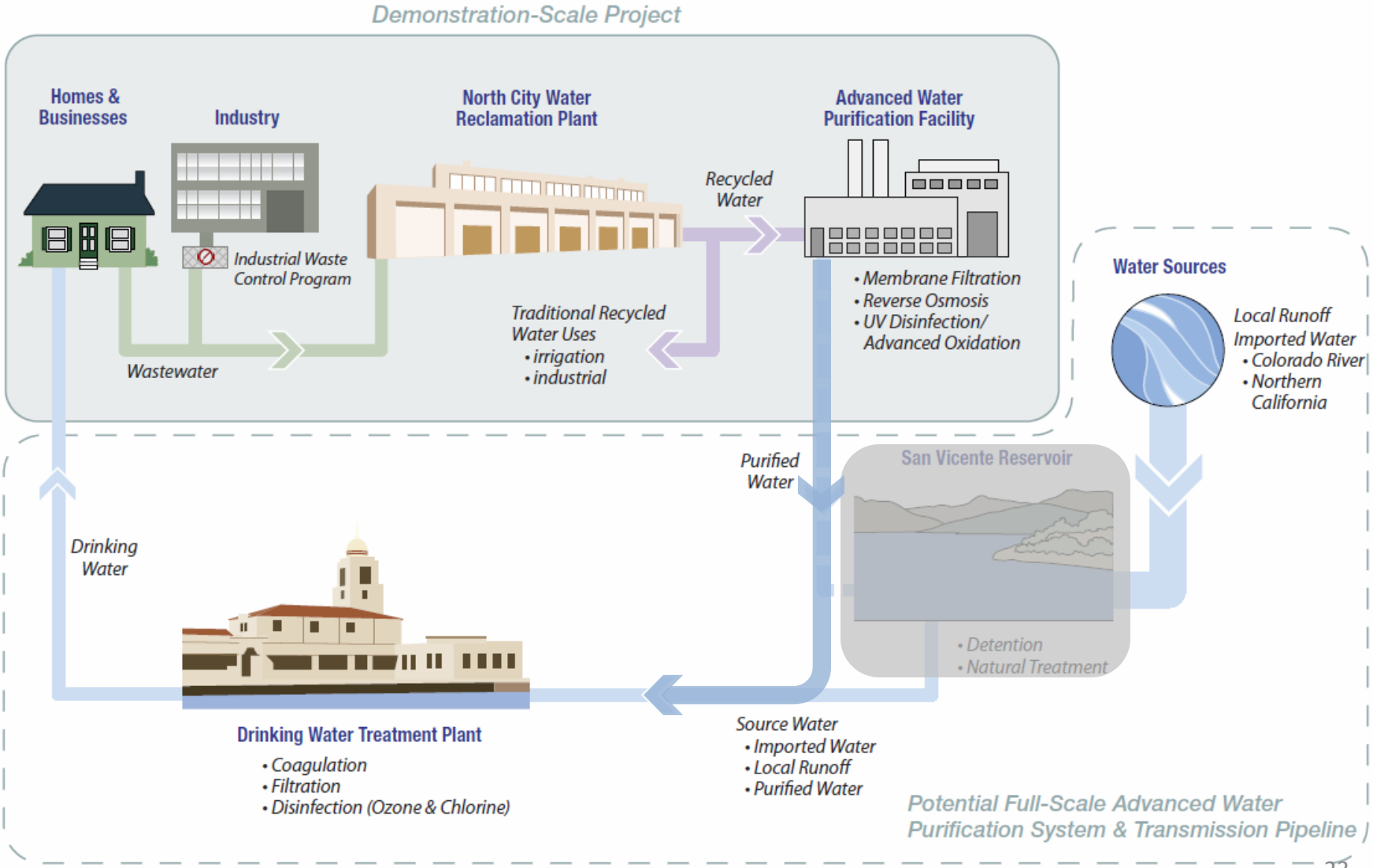


2035 Potable Reuse Potential

City of San Diego's

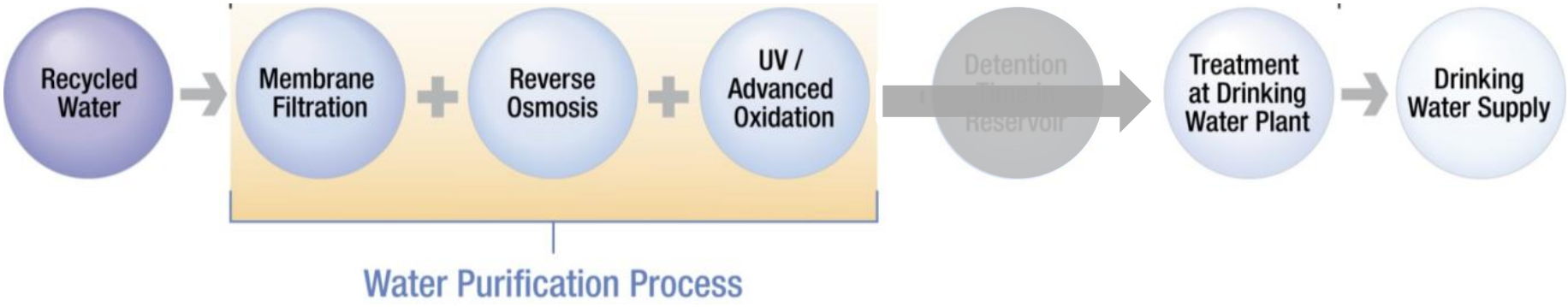
Water Purification Demonstration Project

Purification Process



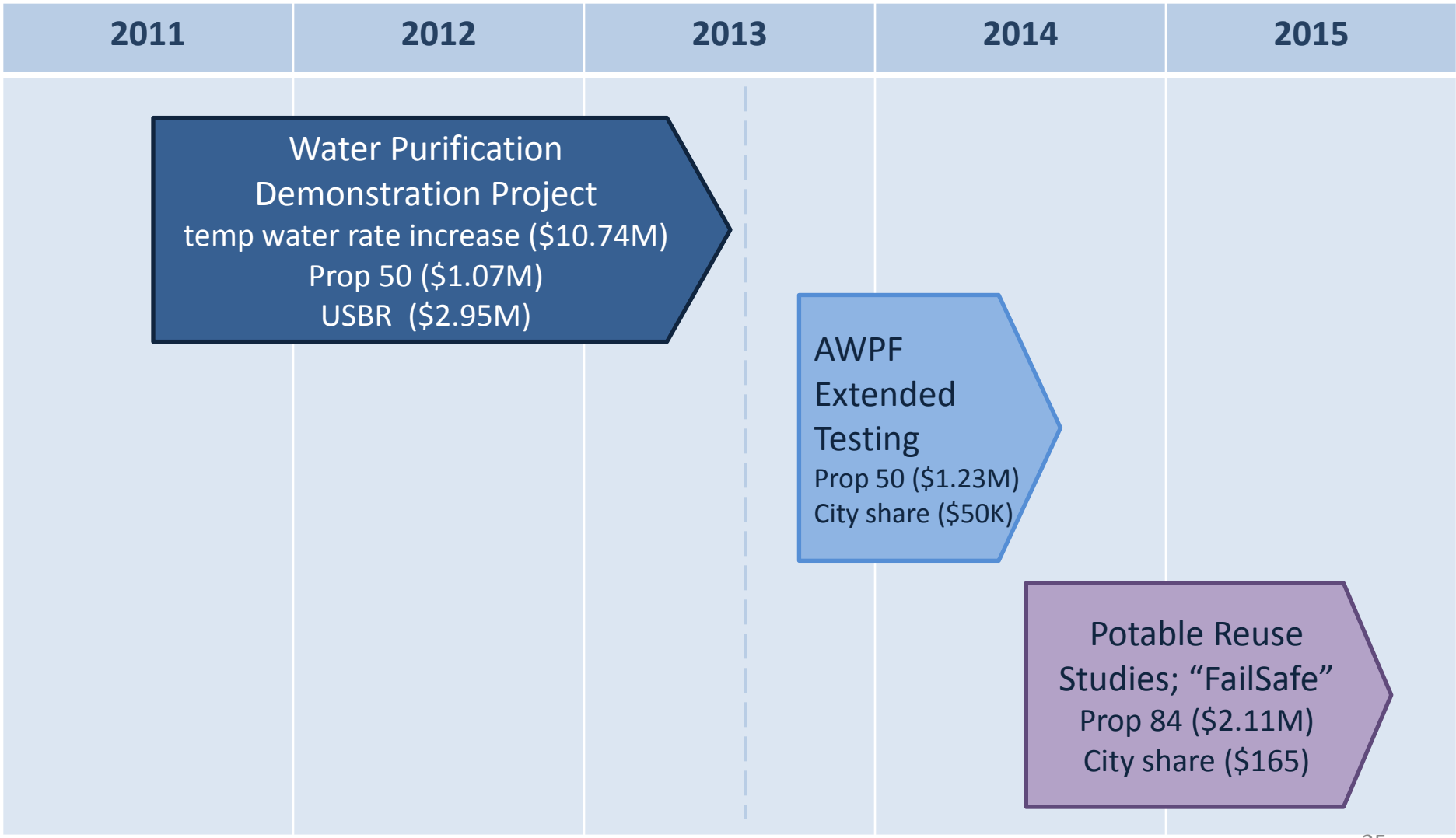
Direct Potable Reuse Concept

Without the reservoir, additional barriers (treatment or monitoring) will be required to achieve the same level of public heath protection. What are those additional barriers?



multiple treatment barriers are the key to protecting public heath

Continued Studies at the Demonstration AWP Facility



Contact Info

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Water Purification Demonstration Project

@PureWaterSD

purewatersd

City of San Diego
PUBLIC UTILITIES
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BACK-UP SLIDES

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Water Reuse Timeline

- 1993 — City & County Water Authority propose Water Repurification Project
- 1994-1998 — Planning, regulatory reviews & conditional approval, preliminary design on project
- Fall 1998 — Water Repurification Project becomes an issue in several closely contested political campaigns
- Spring 1999 — Project cancelled by City Council
- 2002-2004 — City enters into a settlement agreement with environmental groups committing to:
  - Evaluate improved ocean monitoring
  - Pilot test biological aerated filters
  - Study on increased water reuse

WATER REUSE TIMELINE

- 2004-2005 City undertakes Water Reuse Study
- October 2007 City Council votes to proceed with the Demonstration Project

Water Purification Demonstration Project

- November 2008 City Council approves temporary water rate increase (3.08%) to fund $11.8 million Demonstration Project
- January 2009 - August 2010

  Temporary water rates in effect

San Vicente Reservoir Study

Reservoir Enlargement

- San Vicente Dam and Reservoir constructed in 1944
- Reservoir enlarged from 90,000 acre feet to 247,000 acre feet
- Water Authority is constructing facilities
- City will operate reservoir, dam, and outlet works
- Refilling will take three to five years

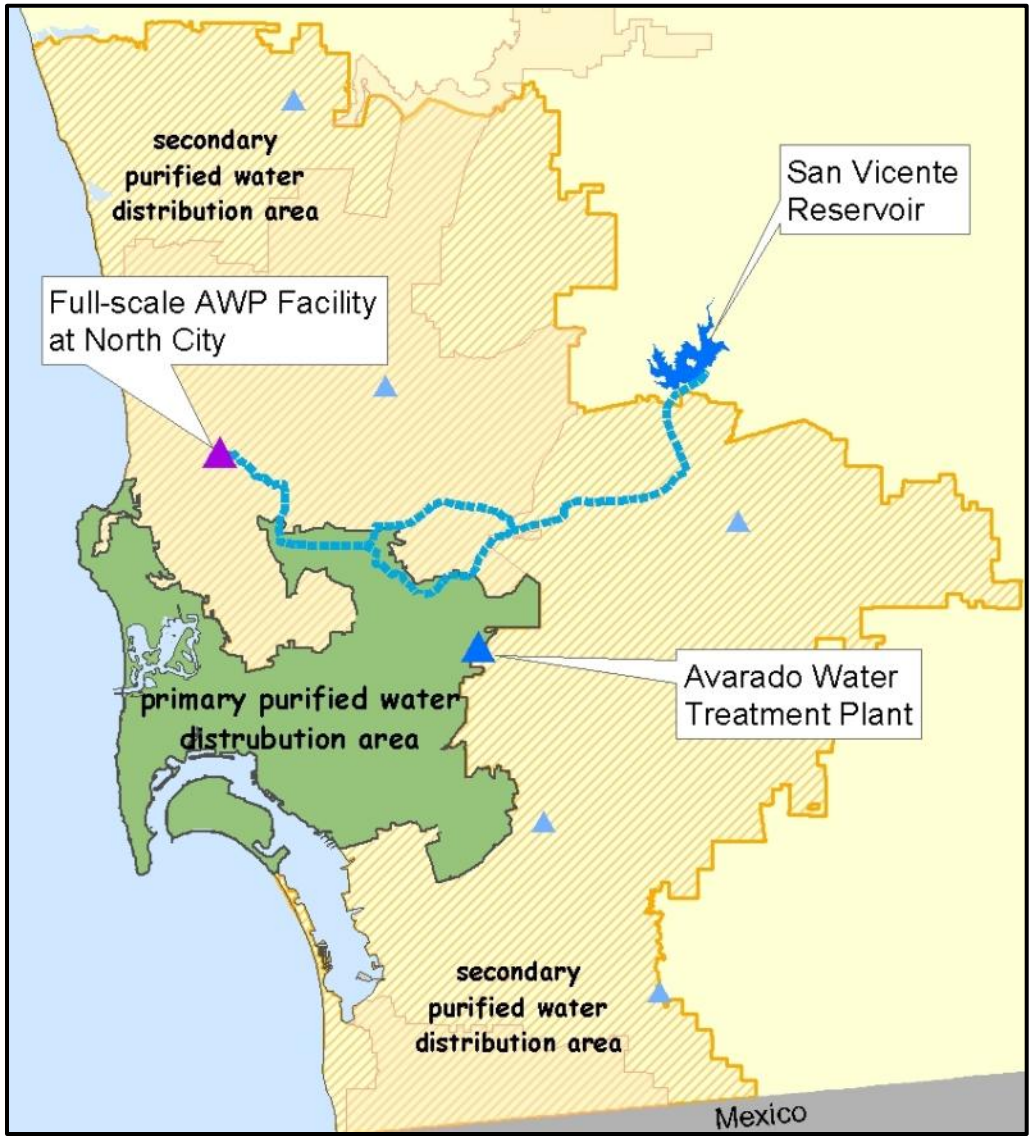
1944 to 2012

2013

Purified Water Distribution Areas

Under normal operations, purified water is delivered to the Alvarado WTP and to the area in green.

In an extraordinary event, such as extended drought, purified water could go to six WTPs and to the crosshatched area.



Pipeline Alignment Study

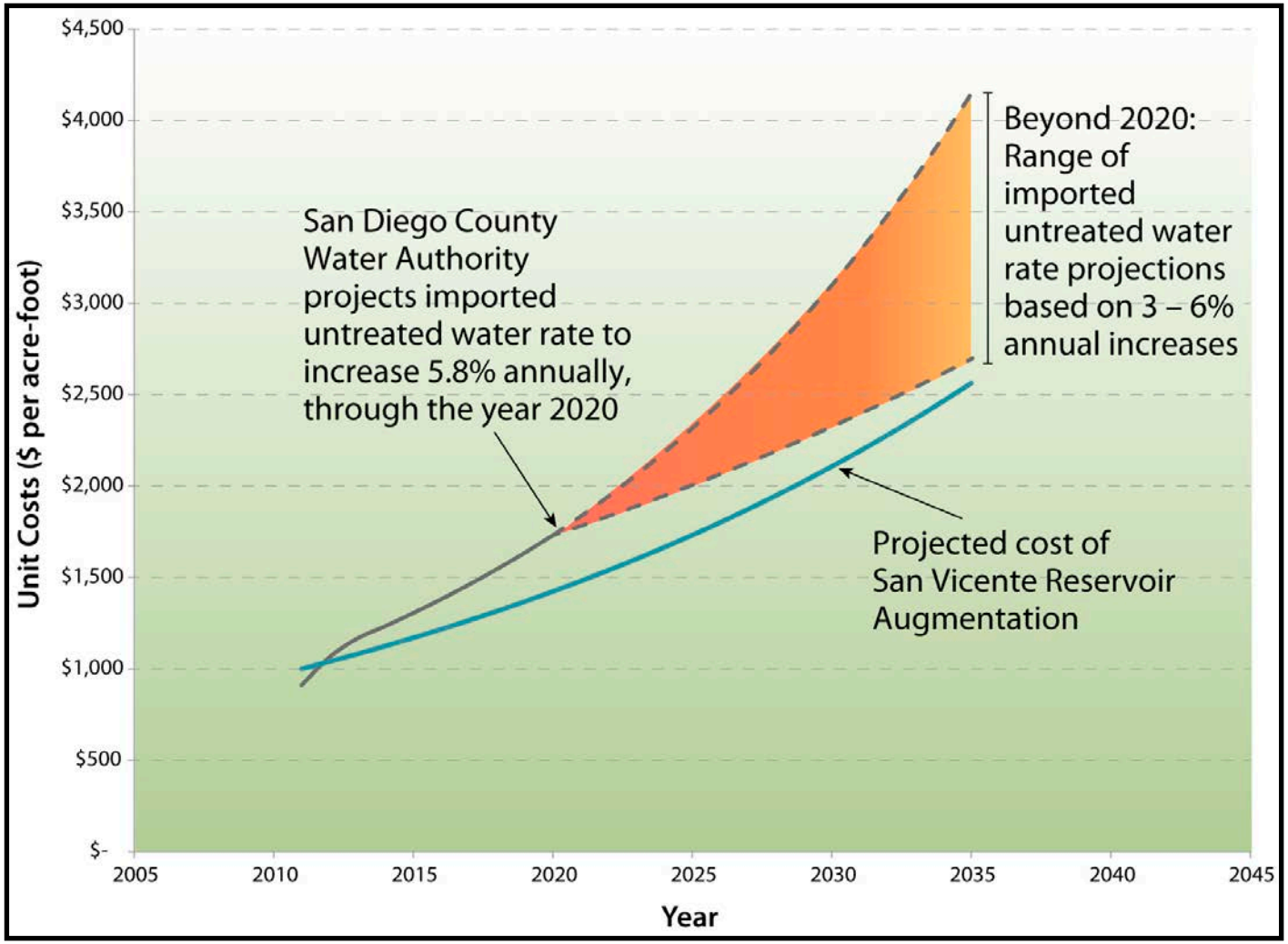
- 22 mile, 36-inch pipeline to convey water from the AWP Facility to San Vicente Reservoir
- Two potential alignments identified:
  - State Route 52 alignment
  - Mission Gorge alignment
- Additional analysis is needed to refine alignment

REGULATED CONSTITUENTS

Regulations/Guidelines	Number of Constituents
California Department of Public Health Goals	
Primary Drinking Water Maximum Contaminant Levels (MCLs)	90
Secondary Drinking Water MCLs	18
Microbial	4
Notification Levels	30
Groundwater Replenishment Criteria	142
San Diego Water Board (projected)	
San Vicente Reservoir Limits	143
Total	231

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

COMPARING THE COST OF THE WATER



Projected cost of purified water (solid line) of a full-scale reservoir augmentation project at San Vicente Reservoir compared to actual and projected costs of untreated imported water (dashed lines).

Demonstration Project
San Vicente IPR/RA Cost Estimate

	Capital	Annual Operating and Maintenance
AWP Facility	$144,700,000	$8,145,000
Pipeline & Pump station	$224,500,000	$3,385,000
Increased North City Tertiary Treatment	$0	$3,965,000
Total	**$369,200,000**	**$15,495,000**

- Result - $2,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir

Demonstration Project, San Vicente IPR/RA
Avoided Wastewater Costs

	Capital	Annual Operating and Maintenance
Point Loma Wet Weather Storage Facility	$123,000,000	$6,150,000
Reduced Treatment at Point Loma	$0	$2,210,000
Reduced Pumping at Pump Station No. 2	$0	$450,000
Total	**$123,000,000**	**$8,810,000**
Total (per-acre-foot basis)	**$1,000**	

- Net cost: $1,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir